

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA  
(INCLUDING THOSE MET WITH IN THE HILL STATIONS  
OF THE BOMBAY PRESIDENCY)

BY

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PART XXXVII

(Continued from page 351 of this Volume)

Genus 28.—BARACUS.

*Imago*.—This is very like or similar to *Taractrocera nicévillei*, only larger, on the upperside; below it is different. See description below.

*Antennæ*.—With the club moderate, gradual, rather long, acuminate and somewhat suddenly bent, though curved, about half the length of the costa of forewing.

*Palpi*.—Porrect, conspicuous as to third joint; second joint somewhat laxly scaled.

*Hind tibiæ*.—Fringed and with two pairs of spurs.

*Forewing*.—Vein 12 ends on costa before end of cell; 11 curves upwards and runs close to 12 but does not touch it; cell less than two-thirds the costa; middle discocellular longer than lower; vein 5 emitted below the middle of discocellulars; 3 from close to lower end of cell, 2 from about one-third before end; wings somewhat short, triangular; costa gently arched; apex subacute; outer margin convex, hinder angle rounded; hinder margin longer than outer.

*Hindwing*.—Vein 7 emitted close to upper end of cell; 5 almost obsolete; discocellulars faint; vein 3 close to lower end of cell; 2 from less than one-third from end; wing evenly rounded.

*Egg, larva, pupa, habits*.—See below as they are only known for a single species, *Baracus hampsoni*.

The genus *Baracus* consists of four species in British India, one in Luzon, Philippine Islands and one in Tibet and W. China. The Indian ones are *septentrionum*, W.—M. and de N.; *hampsoni*, El. and Edw.; *subditus*, M. and *vittatus* (Felder). These are found respectively in Assam, Sikkim and Burma; in Kanara, S. India; in S. India and Ceylon; and in Ceylon. It is really very doubtful whether *subditus* and *hampsoni* are distinct species by the marking and Swinhoe's descriptions contained in *Lepidoptera Indica*, vol. x, pp. 131-133. Also it may perhaps be worth mentioning that both de Nicéville and E. Y. Watson identified the Kanara species long ago as *Baracus septentrionum*. Swinhoe figures all four species on Plates 787 and 788; *hampsoni*, is figure 3 male, figure 3a female and 3b underside; 3c is the larva and pupa.

**221. *Baracus hampsoni***, El and Edw.—Male. *Upperside* dark olive-brown. Forewing with two pairs of linear, ochreous spots in a line on the disc, two subapical below costa, the other two discal in interspaces 2 and 3. Hindwing immaculate. *Underside*. Forewing blackish-brown, the costal space ochreous in a broad band from base above cell to termen bounded below at apex by vein 6, continued decreasingly down a long termen to middle, interspaces sometimes marked with brown, the veins at others; the subapical spots as on upperside, the discal often wanting—they are always the smaller; and a series of obscure, yellow, subterminal spots in interspaces 3 to 7 on the dark-ochreous suffusion. Hindwing: the ground colour deep-ochreous, including veins, leaving brown,

terminal spots in interspaces 1b to 6, those in 2 and 6 largest, that in interspace 5 the smallest; interspace 1a brown, sprinkled sparsely yellow, the lower half of 1b completely yellow, the upper half with one brown spot under the middle of vein 2 and a series continued straight across interspaces 2, 3, then obliquely outwards across 4, 5 to the terminal spot in 6; besides a brown spot at termen in interspace 7 and another before its middle. *Cilia* dark-brown at base, the outer part lighter brown on forewing, ochreous on hindwing, somewhat soiled at ends of veins.—Female similar to the male (Swinhoe says). Antennæ black above, the bend not abruptly at a right angle, below ochreous with the joint narrowly black; the club black above and below with the tip brown-red; palpi brown above, whitish beneath and the third joint yellow beneath, porrect, somewhat prominent; second joint moderately densely scaled. Head is brown with some ochreous scales; thorax more or less concolorous with wings; abdomen absolutely concolorous with wings; below very pale ochreous, the legs with a strong rusty tinge.

From a large series bred in Kanara the female differs from the male in having an extra small, quadrate spot just touching vein 1, not reaching halfway across the interspace 1 situated under the middle of vein 2 as to position and often joined by a line of yellow scales to the inner, lower corner of the spot in 2; there is, also, often an extra subapical dot in interspace 8 and even a few yellow scales in 5 below the outer, lower corner of the spot in 6. The underside of the female is also duller-ochreous on both wings, more brown-washed. The male has a broad ochreous scale-sprinkled area above vein 12 on the upperside of forewing reaching half way to termen, some few ochreous decumbent hairs at base of inner margin and absolutely no hair-fringe along that margin. On the upperside of hindwing there is a sparse covering of longish, brown hairs below the cell from it to anal margin. The female has the costa very slightly tinged with ferruginous in the same place; and the third joint of palpus is slightly more prominent than in the male. Expanse 27 mm. in the female, slightly less in male.

*Egg*.—It is more or less hemispherical in *shape* but the cylindrical sides are somewhat prolonged for a true hemisphere. The *surface* is shining and very finely tuberculate all over with minute, isolated tubercles; there are 17 thin, slightly raised meridional ridges starting from the absolute base and losing themselves towards the top of the egg, the space on the top where there are none being 0.5 mm. in diameter: all this space is minutely cellular and at the very apex is the depressed, somewhat irregularly-circular micropyle surface which itself is extremely minutely cellular-reticulated; the surrounding larger cells are 0.5 mm. in diameter; the micropyle-surface is 0.15 mm. in diameter; the space between the ridges at base of egg is 0.15 mm. and at top where they lose themselves it is 0.10 mm.; the breadth of a ridge is just one-third of 0.05 mm. and the height is about the same. The *colour* of the egg is a pearly white blotched irregularly and largely with blood-red. The ridges are minutely and irregularly beaded. B: 0.85 mm. H: 0.65 mm.

This egg, or rather four eggs of this type were sent from Karwar to-day, July 26, 1918; they were laid on grass or rice, on the upper surface, always close to the edge or towards the point.

*Larva*.—At 9.45 on the morning of July 31, the four larvæ emerged from the egg: little honey-yellow, cylindrical things with enormous, nearly black, shining, smooth heads and a black, rather broad collar on segment 2 which occupies the middle of the segment nearly from spiracle to spiracle and is about half as broad as the segment is long; the body is provided with the usual erect hairs, short and fine with no sign of dark tubercles at their base. L: 2 mm. and breadth one-sixth of that; the head about 2x as broad as body. The larva emerges through the top of the egg, eating round with its jaws up to the commencement of the ribs: the opening thus made, all the substance of the 'lid' being thus consumed as food, is exactly the diameter of the head which first emerges through it: 0.50 mm. The egg-shell is nibbled a bit as food round the open edge but not always consumed—perhaps never. Then the larva immediately wanders off, spinning web-steps as it goes.

In the last stage but one the head is shining black, irregularly and strongly rugose-reticulate, nearly quite round (except for truncation of mouth-opening and slightly prominent mouth-parts) with no sign of sinus on vertex and a punctate-depressed, thin line to the apex of the triangular clypeus, the surface covered with minute, hardly visible semi-appressed grey down, which is, however, fine and does not obscure the shining black; some very slightly longer

hairs about mouth-parts. The body is now glaucous green, the segment-margins marked thinly darker green and shining with four completely circling, parallel lines in front of each and a fifth parallel, partially encircling beyond—only the dorsal part of this last present; the whole covered with extremely minute, erect, fine white hairs except the anal segment which has them much longer and dark and each one (on this segment only) arising from a dark, small, conical tubercle, those round the margin still longer (again only the margin of the anal segment); the legs and prolegs all short and rather weak; the transverse section of body nearly circular except the anal segment which is flattened, long semi-circular in shape and conspicuous because of its clothing of tubercles and hairs; segment 2 white in its anterior half but with no black collar now; the glaucous green colouration of the whole body punctated with very numerous darker green dots except on ventrum and legs and anal segment; segment 13 about half the length of segment 12. *Spiracles* light yellowish; of segment 12 slightly larger, those of segment 2 much larger; all somewhat prominent; the spiracles are very small as a matter of fact and are all connected by a straight, thin, subspiracular, yellowish tracheal line showing through the skin. *Colour* glaucous-green with the dots and margins and parallel line mentioned above darker green; a dark, dorsal, thin band greenish-purplish, a subspiracular, thin tracheal line yellowish; the anal segment yellowish-white set with numerous brown, small tubercles; L: 19 mm.; B: 2.5 mm.

When full grown the *shape* is still rather long and slight, the front segments somewhat flanged along the dorsoventral margin. The *head* is very broadly oval with a very slight, triangular, narrow sinus on vertex, the surface rather strongly, irregularly cellular-rugose and covered with a clothing of very minute, accumbent, rather sparsely disposed, fine hairs; the clypeus is longly triangular, about half the height of the face; the false clypeus outside it much larger, triangular, nearly three-quarters the height of face; the labrum is very short but broader slightly than long; the ligula is rather large, with a large, deep, triangular sinus; both it and labrum red-brown, shining, like the surface of the face and head generally; the antennal joints the same colour, the second lighter than the basal one; the eyes are black, the first four in a curve, all close together, the two lower ones equal in size, larger than the two upper; colour of head generally brown-orange, lighter upwards, the clypeus, false clypeus and a narrow band down from vertex on each side of dorsal line somewhat lighter. *Surface* of larva is dull, smooth except for a covering of extremely minute, erect, light, fine hairs; that of the anal segment similar to the last stage; the segment margins well marked, the impressed, thin lines parallel to the hinder margins (immediately in front of them that is) also well marked; segment 13 about half the length of 12; segment 2 smooth and white; the legs and prolegs short and stout. *Spiracles* similar to last stage, very small, rather narrowly oval, prominent, light yellowish; those of segment 12 nearly twice the size, those of segment 2 much larger and broader oval. *Colour* olive-green, the segment-margins showing thinly darker and covered with darker green small spots all over the body, the whole except segments 2 and 14 with a rose flush or tinge except ventrally; segment 2 white, segment 14 whitish or lightish. L: about 25 mm.; B: 5 mm. at middle.

Under the lens there are some small, oval, glassy-looking, tubercle-like dots here and there on each segment which do not seem to coincide with the bases of the principal subdorsal, dorsolateral, spiracular hairs that larvæ generally possess—here these hairs are in no way longer or stronger than any others.

*Pupa*.—This is in no way out of the ordinary in *shape* except that it is somewhat slight; the *head* is square, rounded in front with a central, dorsal depression; the surface crinkled all over; the dorsal constriction at segment 5 slight; lateral outline parallel from the shoulders to end of wings, then the body gradually decreasing in diameter to the stout, square cremaster which is truncated at end with a short, sharp point at each corner that diverge slightly backwards; this cremaster with the perpendicular sides at base hollowed out and with strong, dorsal extensor ridges on each side with the dorsum between them concave from front margin to end; the whole of the hinder extremity of the cremaster is set with a dense fringe of longish, strong, hooked shafts between the two points. *Surface* smooth, shining and pitted all over on abdomen, rather coarsely wrinkled on head and segment 2. *Spiracles* of segment 2 indicated by a very conspicuous, large, dark-brown, ear-shaped, slightly-raised, somewhat funnel-shaped expansion on edge of thorax; the other



spiracles are light-brown, longly-oval, each with a small, dark-brown line above and in front of it. *Colour* dirty brownish-soiled, subtranslucent white; end of cremaster dark-brown, the cremaster itself thin-translucent; a subdorsal, small, brown spot on each segment. L: 15.5 mm.; B: 3.125 mm.

*Habits*.—The larva makes a cylindrical cell by joining the edges of a blade of grass together at the point, either underneath or above and eats away the part of the leaf above the cell towards the stalk, leaving nothing but the midrib by which the cell hangs free; it clothes the inside with silk, thickened into steps along the sides and excretes a cereous, white powder at the end of the last stage when about to pupate. It makes cells as required to suit its increasing growth and, often, the old ones are found lying on the soil below. The pupal cell fits the chrysalis tightly and is closed at end by a little piece as a lid to prevent the ingress of enemies. This cell is, as often as not, cut loose and falls to the ground before the change takes place—it is then often more or less withered-looking and very inconspicuous amongst the lower dead blades of the grasses lying about. The pupa is attached inside by a string round the middle and by the tail; the body-string is jet-black. The butterflies frequent the hills of the Kanara District on the Western Ghats where the rainfall is anything from 150 in. to 400 in. It is very like *Taractrocera ceramas* in its habits, keeping close to the ground amongst the herbage, generally along the sides of paths and edges of clearings or openings in the jungle. It does not go into large openings like fields of paddy or extensive village sites. It flies somewhat weakly and never for long at a time; rests with its wings closed over the back either on the ground or on a grass-stem or leaf, etc., near the ground and is not fond of too much sun. In the monsoon months it is not an uncommon insect in Kanara above 1,000 ft. level but is rarely seen in the dry months. Its habitat is 'Kanara, S. India' according to Swinhoe and he remarks that it is 'A good and distinct species. The types in coll. Elwes came from North Kanara. We have both sexes from Karwar where Davidson, Bell and Aitken bred it. The larva and pupa now figured are from Davidson's original drawings; Hampson records it from the Nilgiris.' But, evidently Swinhoe does not believe the Nilgiri record. The larva feeds upon the soft grasses of the shady jungles.

#### Genus 29.—CUPITHA.

*Imago*.—Rather of the style of *Telicota* in the matter of pattern above; but a slenderer insect. Underneath the wings are pure sulphur-yellow except for the whole cell and outer area below vein 2 in a large triangular patch to tornus which is black on the forewing and the interspace 1b on the hindwing which is black in a long triangle with its base on the outer margin, coming to a point at base of wing.

*Antennæ*.—About half as long as the costa of forewing; club moderate with a pointed, abrupt crook rather longer than its breadth.

*Palpi*.—Second joint densely scaled; third joint minute, porrect.

*Hind tibiae*.—Very slightly fringed with hair and with two pairs of spurs.

*Forewing*.—Vein 12 reaches costa before end of cell; cell about two-thirds length of costa; discocellulars nearly erect, upper minute, lower much shorter than middle, vein 5 strong from below the middle or junction of middle and lower; 3 emitted about one-eighth before end of cell, 2 from middle; costa arched at base, then nearly straight to apex; apex subacute; outer margin



convex about equal to inner margin. In the male there is a short tuft of hair attached to the underside close to the origin of vein 1.

*Hindwing*.—Vein 7 a little before upper end of cell; discocellulars very faint, vein 5 absent; veins 2, 3, 4 equidistant from each other, close together; in the male there is a glandular patch convex on the underside at the origin of vein 2 distorting the lower margin of the cell and altering the relative positions of veins 2, 3; costa highly arched at the base, then nearly straight to apex which is rounded though well pronounced; outer margin evenly convex, hinder angle also pronounced.

*Egg, Larva, pupa, habits*.—See below as there is only a single species in the genus.

**222. *Cupitha purreea* (M.).**—Male. *Upperside* black-brown with gamboge-yellow markings. Forewing with the costal space above vein 12, reaching the middle of costal length and ending pointedly, leaving the costa very narrowly brown, gamboge-yellow; also a thin line from base running along the upperside of vein 1 to broaden at middle of interspace 1 into a trapeze-shaped spot filling the spaces up to vein 2, its inner edge slanting up to strike the vein well after its junction with cell, its outer edge straight; this spot being the basal portion of an outwardly oblique band ending narrow about the middle of vein 5, then turning up at right angles towards costa to fill interspace 5 as far up as 6 with a spot that is rather broader than the end of the band it arises from; the band consisting of one large, quadrate spot in interspace 2, its outer edge finishing somewhat further out than the lower trapeze-shaped one, followed by (the vein separating them even is yellow) a smaller spot filling the base of interspace 3 and reaching out a bit beyond the one below it, finishing with a somewhat oblique-edge spot in 4, the last one of the straight part of band; besides this there is a quadrate spot in the lower half of the end of cell joined on to the band by the yellow vein between the bases of veins 2 and 3 and separated from the outer end of band in interspace 4 by an interval of ground colour as large as itself; this yellow band-area has also a slightly less well-defined continuation below vein 1 to base of wing along the inner margin; there is a little long, decumbent, yellow hair covering under vein 1 towards base of wing; the hair-fringe along inner margin is very slight. Hindwing with a transverse band of nearly even width straight across the wing consisting of the basal half of interspace 2 all but the extreme base, continued across interspaces 3, 4, 5 and in the other direction into interspace 1b; the cell has a few decumbent, yellow hairs in it and there is a thick fringe of it in interspace 1a; the very base of wing is bare of scales and shining owing to the 'tympanum' of the sex-mark. The transverse, yellow band is very obscurely continued upwards from interspace 4 to costal border—but this is only indicated. *Underside*: pure gamboge-yellow. Forewing with the whole base of the wing black in the cell to nearly its end, extending downwards across the base of interspace 2, then obliquely inwards; the discocellular veins diffuse-brown (very faint sometimes) and a large black patch just before tornal angle in interspace 1, expanding upwards in a triangle to the middle of interspace 3. Hindwing with interspace 1a black except, sometimes, it is yellow to nearly half way out from base, the veins 1a and 1b, however, always edged black along the yellow. Antennae are black above except the extreme tip of club which is brown-red; below, the shaft is yellow touched with black at the joints, the club black with the tip more longly red; the tip is short and bent back at less than a right angle. Palpi with the small, conical third joint black, the second black above but the hairs surrounding the third yellow; below gamboge-yellow. Thorax and head above yellow, below paler; the legs with tibia and tarsus orange-yellow as well as the coxa of the hind legs—this is nearly red. Abdomen black above and below, banded with yellow. The sex-mark is convex below, flattened-convex above, covered with scales below, bare and grey above and surrounded by a bare, shining space.—Female like the male, the gamboge-yellow band somewhat narrower. Expanse 27-30 mm.

*Egg*.—The egg is in shape a depressed hemisphere or limpet. The surface is divided into sections by, first, a large apical annulus from which 14 thin, absolutely regular, yellow meridians run to base; there are none inside the ring in the very centre of which is situated the micropyle; the ring is twice as broad and twice as high as the meridians, but all are composed of the same yellow, waxy-looking, pitted substance. Colour of egg is deep brown-red, the meridians and ring yellow. B: 1.3 mm.; H: 0.8 mm.

*Larva*.—The *shape* is somewhat like that of *Padraona dara*; the body held somewhat hunched in segments 3-5; the head drawn in, the mouth stretched forward; the anal end lying flat on the surface as also the ventrum. The *head* is more or less heart-shaped, the vertex-sinus very small and shallow, the face only moderately convex; the surface rough-reticulate, covered by an efflorescence of waxy little rough balls of white which look like scales to the eye; the true clypeus small, triangular, with the apex acute, about one-third the height of face, higher than broad; the false clypeus a broad, outwardly convex strip outside it, also triangular with the apex acute reaching more than half-way up face; the labrum a transverse curved (upwards) piece; the ligula small, kidney-shaped, both it and the labrum yellowish, shining; the ligula shortly haired along front margin; antennal basal joints both red-brown in colour; the mandibles red-brown, toothless; the eyes, four top ones in a strong curve, the two uppermost closer together than 3, 4; 6th in a straight line with 3, 4 but further removed from 4 than 4 is from 3, the fifth making an equilateral triangle with 5, 6 and behind them: all black; colour of head dark red-brown overlaid with white scales (see above); the hinder margin black; segment 2 occupied from spiracle to spiracle by a broad, chitinated, red-brown collar taking up most of the length of the segment, the whole segment much narrower than head. *Surface* of body covered with minute, short, white, erect broad-topped hairs about the same length as the spiracles except in the spiracular region including the margin of anal flap where they are longer but similar; segment-margins distinct; legs and prolegs short; anal flap trapeze-shaped, the hinder margin long, at least two-thirds the front margin, rounded as well as the extreme angles, the central portion of segment dorsally convex, sloping steeply to front margin leaving the lateral parts of the segment all round as a sort of flange; segment 13 over one-third length of 12 with the hinder margin very slightly slanting on each side backwards so that the segment is longest in the dorsal line; segment 14 equal in length to 12; all the segments lined transversely in the usual way with fine lines, all parallel to each other, 6 or 7 from hinder margin forwards on each segment. *Spiracles* small, very light-yellow, oval, those of segments 2, 12 double the size. *Colour* really green, the skin thin and the tracheæ visible beneath; but seemingly yellow from the fact that each little hair rises from a diffuse, small, more or less circular spot or blotch more opaque than the general skin; a dark-green, dorsal line turning to maroon from segment 11 to anal end, from segment 3 to end; the front and hinder margins of segment 13 also more or less maroon with a slight suffusion of that colour over the whole of that segment as well as on the extreme dorsal part of 14. L: 25 mm.; B: 4 mm.

*Pupa*.—Is of normal *shape*; fore-end square, blunt; hinder end pointed; fattest in middle; head and segment 2 forming a quadrate piece; thorax stout, clearly separated from segment 2, convex, a little broader than segment 2 and about the same breadth as abdomen at segment 8; the body gradually decreasing in diameter to anal end; cremaster not longer than broad, blunt-ended, decreasing in width backwards (to end), thin between the dorsal and ventral surfaces with two extensor-ridges dorsally, separated by the blunt end of cremaster and diverging slightly forwards; segment 13 about as long as cremaster, also as long as segment 12 which is only slightly shorter than 11; segments 4, 5 co-equal and less than segments 6, 7 in length; the hinder margin of thorax a quarter-circle curve meeting the wings in a very deep, broadly rounded angle of 90°; thorax as long as segments 4, 5, 6 together, only very slightly humped, the line joining the hinder and front margins (dorsal) at an angle of 30° to the longitudinal axis of pupa, the front margin quite straight; segment 2 about as long as segment 4 in the dorsal line, the front margin straight, the dorsal line inclined at an angle of 45° to longitudinal axis; the vertex of *head* fairly broad between the antennal bases, in the same plane as segment 2, with a sub-dorsal lowly convex, circular 'boss' near hinder margin, covered with rather long, erect, thick-topped hairs; the vertex in a plane at right angles to longitudinal axis with a central, more pronounced boss than that on the vertex, this boss flattened somewhat dorsally, also covered with hair of the same length as the other; proboscis reaching free to end of segment 10, the antennæ not reaching ends of wings. *Surface* shiny-corrugated irregularly under a strong lens, nearly smooth to the eye; clothed with erect, light, soft hairs with thickened tops which are about 0.17 mm. in length where they are shortest; there is a tuft of longer hairs—

as on the bosses on the head,—subdorsally on segment 2 also, these longer hairs all being about 0.5 mm. in length. *Spiracles* of segment 2 indicated by a large, oval, convex, raised, dull orange expansion which is 0.55 mm.  $\times$  0.25 mm.; the other spiracles are small and oblong, 0.175 mm.  $\times$  0.05 mm., light yellow, slightly raised. *Colour* is a light olive-green; often covered over with a cereous, white powder.

*Habits*.—The egg is laid in a cool part of the forest, often in a nalla-bed or near water; always single and on top of a leaf. The young larva makes a cell by turning over a small, oblong piece from the edge onto the top, making a cylinder out of it by joining the edge to the leaf-surface and it clothes the inside densely with silk; one end of the cylinder is closed by a small piece turned up from the free margin of leaf and held perpendicular by silks. Similar cells are made as required; later on of course larger; at the last moult the larva eats through the leaf on both sides of the midrib and perpendicularly to it from the edge and slightly into the substance of the midrib so that the part of the leaf beyond the cut hangs down; the edges of this hanging portion are then joined together, the portion withers and gets quite hard and shrivels—all but the well-coated inside tube along the midrib in which the larva lives; the opening is next the green portion of the leaf. Inside this cell it changes to the pupa. It only feeds at night and is very shy disliking the light; the elongate cell is often fastened to the underside of the leaf up against the green part to protect it the better from the sun and the rain. Not much is known about the habits of the imago as it is not a common insect and the flight is extremely rapid. It has been seen on the crest of the ghat in Kanara sitting on the top of a leaf once low down, but only for an instant; it has not often been caught on the wing; only once below the ghats at sea-level; the larvæ, however, are not uncommon above ghats in the semi-evergreen jungles at about 2,000 ft. on the leaves of *Combretum ovalifolium*, Roxb. *Terminalia belerica*, Roxb. and *Terminalia paniculata*, Roth., both of the family *Combretaceæ*; once, also, on *Ehretia laevis*, Roxb. (*Boraginaceæ*). The distribution is mentioned as Sikkim, Assam, S. India, Burma, Andamans, Java, Nias, Philippines.

#### Sub-family (8).—BAORINÆ.

This sub-family contains the genera *Baoris*, *Gegenes* and *Iton*. The last does not concern these papers. They are all butterflies that are most extraordinarily alike, mostly medium-sized, nearly all the same brown colour on the upperside with subapical dots and discal semihyaline-white spots on the forewing. The first genus is a very large one and it may be divided from *Gegenes* as under:—

- A. Antennæ: with the terminal crook minute, never as long as the width of club. . . . . *Gegenes*.
- B. Antennæ: with the terminal crook short, as long as, or slightly longer than the width of club . . . . . *Baoris*.

*Gegenes* only contains two species in British India and one in Hainan. The ones in India are called *nostradamus* from the N. W. Himalayas, extending to Central Asia, S. Europe and N. Africa; and *karsana* from Burma, Western India, Sind, Baluchistan, Afghanistan. *Baoris* contains twenty-five species not occurring in British India with twenty-nine that do—or a total of 54 species. To deal with these as a single genus evidently appeared somewhat difficult, for at various times they have been divided into sub-genera called *Baoris*, *Parnara*



and *Chapra*. Swinhoe makes use of these and another, *Caltoris*. They can be distinguished as below:—

A. Antennæ: with the club short, stout.

(a) Forewing: male with a linear, discal, white stigma *Chapra*, M.

(b) Forewing: male without such stigma . . . *Parnara*, M.

B. Antennæ: with the club comparatively elongate.

(a) Hindwing: male with a tuft of long hairs on the upper side attached along the upper margin of cell and directed downwards across the cell

*Baoris*, M.

(b) Hindwing: male without any such tuft . . . *Caltoris*, Swinh.

*Imago*.—Always of some shade of dark-brown above and below with the forewing nearly always marked with hyaline-white spots, three sub-apical, often two at the end of cell, and two or three on the disc or even more; the hindwing very generally immaculate, at the most with (except in *Iton* where there is a large, white patch) some small semi-hyaline-white dots. The underside of forewing generally paler than on the upperside; the hindwing often suffused grey or green or yellow and with some discal dot-spots.

*Antennæ*.—Short, about half the length of the costa of forewing or even shorter; club moderate or short and stout with a short, sometimes very short, terminal costa.

*Palpi*.—Second joint densely scaled; third very small, often concealed.

*Hind tibia*.—With two pairs of spurs.

*Forewing*.—Vein 12 reaches costa before end of cell; cell less than two-thirds the length of costa; upper discocellular minute, distinct, outwardly oblique (in *Iton* appearing like a straight continuation of end of cell), the lower much the shorter; 5 consequently arising close to lower end of cell, curving gently up to get into position between 4 and 6; vein 3 from near lower end of cell, 2 from close to it; costa slightly arched; apex subacute; outer margin convex, about as long as the hinder margin; tornal angle blunt.

*Hindwing*.—Vein 7 from before end of cell; discocellulars outwardly oblique, faint; 5 absent; 3 from close to end of cell; 4 also close to 3.

*Egg*.—In *shape* it is a high dome standing on a very narrow, shelving base. *Surface* only slightly shining and quite smooth even under a high-power lens; under the microscope there are indications of some, sometimes very many, meridional ribs on the basal band but they are extremely obscure. *Colour* from very light-green to very pale honey-yellow when first laid; turning a kind of dull bone-colour later.

*Larva*.—Nearly always white, subcylindrical in *shape*, with a broadly-rounded anal end that lies flat on the surface; flattest just before middle, the neck rarely as broad as half the breadth of body at middle; the *head* always very much broader and higher than neck, more or less semielliptical in shape, either broad or narrower at apex, hardly bilobed, the surface somewhat shining, minutely cellular-rugose and covered with minute, appressed hairs that do not hide the sculpture or the colour. *Surface* of body dull, covered with extremely minute, fine, erect, light hairs all over, these rather longer round the free margin of anal segment; segments well marked though never constricted in the least at margins, with superficial, impressed lines that are transverse and 5 or 6 in number, on the hinder half of every segment. *Spiracles* of segments 2, 12 much larger than others. *Colour* always a semi-translucent looking light grass-green all over with the cremaster a bit whiter and the wings the same after a few days; always with a powdering of the cereous-white powder excreted just before the change to pupa.

*Habits*.—The eggs are always laid on the underside of a bamboo or grass leaf or blade; the little larva eats the shell generally completely for a first meal; then makes a cell by drawing together the edges of the leaf at tip over the undersides, often very laxly. When it is full grown it does the same by the whole leaf but even more laxly still, leaving it more or less quite open, just bent into a half-cylinder tube in which it lies, coating the bed with carpet of silk. It finally pupates in such a half-tube made with a couple of ropes of silk to keep the leaf bent, the inside carpeted, the pad for attachment of the cremaster not extremely thick with a simple rope across it to the middle of which the hooks of the cremaster are fixed; the body of the pupa also has a string round it. The

growth of the caterpillar is normal in the way of time; the pupal stage lasts about ten days but may be prolonged for some days. The butterflies are powerful fliers and some of them at least are characteristic of the Plains of India though even these are always to be found in the jungles and hills as well. Only *Gegenes* is purely an insect of the dry, arid places, the deserts chiefly.

Taking the divisions *Baoris*, *Caltoris*, *Parnara* and *Chapra*, the following are the respective insects that occur in British India including Burma, Ceylon, etc. :—

\**Baoris farri* (M.), from Sikkim, Assam, Bengal, Kanara (Bombay), Ceylon and Burma and the Andamans.

*Baoris unicolor* (M.), from Sikkim and Assam.

\**Caltoris kumara* (M.), from S. India, Ceylon.

\**Caltoris seriata* (M.), from S. India, Ceylon.

*Caltoris aurociliata* (El. and Edw.), from Sikkim.

*Caltoris plebeia* (de N.), from India, Burma.

*Caltoris tulsi* (de N.), from Sikkim, Assam.

*Caltoris austeni* (M.), from Sikkim, Assam, Burma, China.

*Caltoris onchisa*, Swinh., from Assam.

*Caltoris cahira* (M.), from the Andamans and Nikobars.

*Caltoris moolata* (M.), from Burma, Perak, Malay and Archipelago, Tonkin.

*Caltoris pagana* (de N.), from Sikkim, Assam, Burma, Borneo, Sumatra.

\**Caltoris conjuncta* (Herrich-Schæffer), from India, Ceylon, Hongkong, Malay Peninsula and Archipelago.

*Caltoris assamensis* (W.—M. and de N.), from N. W. Himalayas, Sikkim, Assam, Burma, Hongkong, Tonkin.

*Caltoris* (?) *uma* (de N.), from the Karen Hills, Burma.

*Caltoris eltola* (Hewits.), from N. W. Himalayas, Sikkim, Assam, Chin Hills, China.

*Caltoris discreta* (El. and Edw.), from Assam, Sikkim, Burma.

*Caltoris contigua* (Mabille), from India, Burma, Malay Peninsula and Archipelago, Hongkong, Tonkin.

\**Caltoris colaca* (M.), from Sikkim, Assam, S. India, Burma, Ceylon, Andamans, China, Malay Peninsula and Archipelago.

*Caltoris bevani* (M.), from India and Burma.

\**Chapra mathias* (F.), from India, Ceylon, Burma, China, Japan, Malay Peninsula and Archipelago.

*Chapra midea* (Walker), from Turkey, Egypt, Sind, Kutch, Western India.

\**Chapra subochracea* (M.), from India.

*Chapra brunnea* (Snellen), from Java, Sumatra, Burma, Sikkim, S. India.

*Chapra sinensis* (Mabille), from India, China.

\**Parnara canaraica* (M.), from Kanara, S. India.

*Parnara guttata* (Bremer and Grey), from N. W. Himalayas, Sikkim, Assam, China, Japan, Corea.

\**Parnara bada* (M.), from India, Ceylon, Burma, Formosa, Hongkong, Malay Peninsula and Archipelago.

*Parnara vaika* (Plötz), from S. India.

*Parnara flexilis* (Swinh.), from Poona.

A most difficult lot to deal with and Swinhoe has made a valiant effort to unravel them in *Lepidoptera Indica*, pages 294 to 332 with plates 825 to 834. It will have to stand at that until all the stages of the insects have been worked out and properly studied. The species marked with an asterisk (\*) are those that will be treated below. Notes will be made about others that may seem to occur within the Plains of India. *Caltoris seriata* is certainly a different species to *kumara* although Swinhoe considers them, seemingly, to be one and the same. Davidson, Bell and Aitken in their papers in this Journal in 1897 called what is really *seriata* by the name of *kumara* (and even called it *philippina*) while what is really now *kumara* they called *plebeia*. There is no *plebeia* in N. Kanara District in the Bombay Presidency. It is an easily recognized species because of the presence of 'a long tuft of greyish hairs on the hinder margin of the forewing before the middle, curling upwards and outwards and lying flat against the wing' (*Lepidoptera Indica*, vol. x, p. 302).

#### Genus 30.—BAORIS

##### Subgenus—*Baoris*

*Imago*.—Of large size comparatively. Very rapid in flight, frequenting shady jungles in the hills where there is heavy rainfall.

*Antennæ*.—With the club comparatively elongate, the terminal crook, short, as long as, or slightly longer than the width of the club.

*Palpi, Hind tibia*.—As for subfamily.

*Forewing*.—Immaculate or with semihyaline spots. Venation as for subfamily. In the male, on the underside, there is large, silvery space in the middle of the underside stretching from the inner margin to vein 2 and bottom of cell with a longitudinally-oval patch of furry dark-brown scales in the middle of it on each side of vein 1, this black patch 2 mm. by 1 mm. while the silvery space is 5 mm. long by over 4 mm. broad.

*Hindwing*.—Immaculate. Venation as in subfamily. On the upperside, in the male there is a 5 mm.-long tuft of dark-brown hairs growing down and outwards from the upper margin of cell and covering the whole of the cell as also a furry patch of blackish scales within it that practically fills it.

*Egg, larva, pupa, habits*.—As for the subfamily.

**223. *Baoris farri* (M.).**—Male. *Upperside* dark violet-brown with bronzy tint. Forewing: seven or eight white, semihyaline spots: two near end of cell, well-separated, the lower slightly inwards touching the lower margin; three subapical, the largest half the size of the lower cell-spot, in interspaces 6, 7, 8 in an outwardly-oblique curve, the uppermost a mere dot and in the exact middle of interspace; also an inwardly-oblique series, the uppermost in interspace 4 at the middle of that interspace near vein 5, a dot; the second, quadrate and larger than either of the cell-spots, just before the middle of interspace 3 with the lowest inwards, well out from base of interspace 2, largest, sometimes trapeze-shaped and sometimes also excavated on the outer edge. Some decumbent, brown hairs in interspace 1 from base to about end of cell and a slight fringe of hairs along inner margin. Hindwing immaculate; the sex-tuft blackish-brown with the base pale; a fringe of longish, brown hairs all along vein 1b nearly to outer margin, spreading into interspaces 1b and 1a above and below the vein. *Underside* paler than upperside, slightly ochreous, the marking the same. Forewing with the middle area silvery from and over the inner margin with the oval, dark, furry space or spot in the middle of the silvery area; some longish, decumbent, brown hairs from upper margin of cell directed down over upper half of cell-area. Hindwing immaculate, the base of interspace 1a pale.—Female. Like the male but the spots, larger, that in interspace 2 usually somewhat produced outwards along vein 2. Besides this there is always a smallish spot about the size of the cell-spot above and touching the middle of



vein 1 and there may be a tiny dot in interspace 1 just below the larger spot of interspace 2 and, even, an extra spot above the subapical three in interspace 9. *Cilia* very pale-brown with base somewhat darker, whiter near the tornal angle on the forewing upperside; of the hindwing upperside similar; underneath brown on forewing, whitish in the hindwing. Antennæ black, whitish on the underside with black specks at each joint; base of club whitish below, the tip rather longly reddish. Palpi, head and body more or less concolorous with wings above, the thorax with a grey-greenish tinge on dorsum, the abdomen with the tip ochreous; below concolorous with wings but pectus greyish, palpi ochreous at base; legs with the ends of tarsi ferruginous-tinged, the rest brown. Expanse 45 mm. or less.

In a lot of the specimens bred in North Kanara, Bombay, the males have a spot also just above the middle of vein 1 on the upperside of the forewing but, when present, it is always tiny and the underside of the female forewing shows this spot always blurred though very little diffused on the somewhat pale background which is never silvery as in the male.

*Egg*.—From memory, no description having been kept, this was very much like any of the others of the *Baoris* group; high-dome-shaped; the surface smooth, rather dull and without sculpture, the colour of a whitish dead bone.

*Larva*.—The shape is that of Fig. 3 on the uncoloured Plate II at the commencement of these papers, the larva there depicted being that of *Baoris (Caltoris) conjuncta*, Herrich-Schäffer. The body is thickest in the middle, evenly thinning to both ends, more to the rather thin neck than to the other end; as a matter of fact it thins very little in lateral outline to the broadly-rounded, somewhat flattened anal segment; the claspers and prolegs are short, kept well under the body, the ventrum is flattened: the anal segment is broadly semi-circular, slightly thickened round the free margin, the anterior moiety transversely convex with the dorsal slope about  $20^{\circ}$  to the longitudinal axis of body and very slightly constricted at the front margin; head much broader and higher than segment 2, rather longly semi-circular in shape with a slightly depressed, dorsal line over vertex to apex of clypeus, the face somewhat convex; the surface of the head superficially cellular-rugose, covered with short, fine, whitish hairs that are all erect and hardly as long even as half the breadth of clypeus, some about the mouth-opening, especially below, double that length; the true clypeus is about half the height of face and rather under one and a half times as high as broad, the apex acute; the lateral borders thinly black with a thicker, dorsal, black line in the middle that does not quite reach the apex from base; the false clypeus outside it reaches two-thirds the height of the face and has the apex acute, a strip on each side of true clypeus not as broad as one-quarter the breadth of true clypeus-base, starting from the very corner of the true clypeus-base and broadening out somewhat convexly-outwards to middle, then again converging towards dorsal line, this false clypeus also thinly black-bordered with its dorsal line black too; labrum one-third of the length of true clypeus by four times as broad as long, somewhat curved concavely forwards, transparent-glassy with the middle of front margin brownish; ligula kidney-shaped, about the same length as labrum and nearly as broad but bent strongly in the longitudinal direction, the sinus on the front shallow, transparent-glassy showing the black ends of mandibles through as a dark, dorsal line; antennal, basal joint white, third joint orange or reddish; mandibles strong, light-rusty with rather broadly black ends, the cutting-edges absolutely entire; the eyes arranged with 1 to 4 in a very slight curve, all of equal size and spaced a good eye-diameter from each other equally, number 6 in a straight line with 3, 4 and nearly four diameters further down, 5 behind, three eye-diameters from 4 and rather less than that from number 6, all slightly prominent, glassy surrounded thinly blackish; colour of head whitish with a broad, black band separating the face from the cheeks on each side meeting on vertex, including the eyes and with a branch running from vertex down the dorsal line of face to the apex of false clypeus, then very thin to apex of true clypeus and down the same line thicker to base of true clypeus, sometimes this line in true clypeus somewhat interrupted near apex; both the false and true clypeus thinly outlined black. Surface of body covered with minute, erect, soft, white hairs that are longer round the free margin of anal flap; the usual impressed, fine, transverse lines, six in number, in front of hinder margin of each segment to about half the length of the segment forwards; there is a curious, low, circular, concave tubercle under each spiracle with some longer hairs on it. *Spiracles* whitish, oval, flush, rather small;

those of segments 2, 12 twice as large as any of the rest. *Colour* of body white with a greenish tinge; spotted or dotted all over with green dots; the impressed, transverse line region tinged with yellow on each segment; ventrum whitish with a slight blue-green tinge. L: 44 mm.; B: 6 mm. just before the middle.

*Pupa*.—This is the *shape* of Figure 3a on Plate II; it is circular in transverse section from shoulders to segment 10 and hardly different in diameter between those points; after segment 10 it narrows quickly to the 3.0 mm.-long, spatulate cremaster that is 6× as long as segment 13 and nearly 2× as long as 12 (12 is 1.8 mm.; 13 is 0.4 mm. long); the cremaster is curved downwards and the whole of the dorsum in deeply channelled out from end to end, the channel even continued forwards onto 13 leaving to decreasingly broad margins on the cremaster outside—the cremaster is 2.2 mm. broad at base (front margin) and 0.4 mm. just before end, the channel is 0.8 mm. broad at middle, the margin left on each side 0.8 mm. broad at base, about 0.2 mm. just before end; the head-point is 2.4 mm. wide just before eyes and 0.4 mm. at end, being 3.4 mm. long; the dorsal slope of thorax and segment 2 is about 30° to the longitudinal axis; segment 2 is a transversely-oblong piece about the same length as 12, thorax is as long as 4+5+6 together, 4=5, segment 6=4+5=7=8=9=10=11; the hinder margin of thorax is a curve between a quarter circle and a semi-circle meeting the wings in a deep, somewhat broadly-rounded angle of 90°; the shoulders are quite evenly rounded, not prominent; the head has the eyes not prominent, the clypeus triangular, the ligula small, diamond-shaped, the proboscis produced beyond the end of wings to the end of the cremaster or nearly; the mid legs reach to two-thirds the length of wings, the forelegs to about half the length of wings. *Surface* of pupa shining and minutely, irregularly, superficially wrinkled transversely; besides the surface except wings is covered with minute erect hairs of 0.05 mm. in length and spaced rather more than their own length; the head-snout is wrinkled rather more strongly on the cylindrical distal half than any other part. *Spiracles* of segment 2 indicated by a very slight production forwards in a lobe of the front margin of segment 3, this lobe being dirty-whitish; the other spiracles are about 0.3 mm. long by 0.1 mm. wide and are pointed ovals, flush with the surface and light-yellowish in colour; beneath each spiracle there is a perfectly circular, shining space or spot, a couple of spiracle-lengths off and in front that is 0.1 mm. in diameter. *Colour* of pupa is a watery grass-green, powdered more or less with white waxy powder excreted by the larva, with a darker-green dorsal band; cremaster transparent-glassy. L: 35 mm.; B: 6 mm.

*Habits*.—The little egg-larva has a black head. It lives in a cell made at the side of a leaf by turning over, at first, a little oblong piece onto the top and fastening its edge and one end, making a little cylindrical tube; when grown large it makes a cell by joining the edges of a leaf more or less firmly coating the inside of it with silk. Pupation takes place on the underside of a leaf, the larvæ sitting along the midrib and drawing the edges together only very slightly, never joining them, with two threads, one in front, the other behind; in this hollow pupation takes place quite in the open to speak and the pupa is attached by the tail and a tight body-band; the hollow is powdered with white powder that the caterpillar excretes when about to pupate from glands situated on the sides of segments 9 to 11—probably from the little tubercle-bodies noticed in the description of the larva, subsisting over into the pupal state as little circular, shining, 0.1 mm.-wide spots (noticed above). The butterfly is found on the Western Ghats in Kanara, in heavy jungle where bamboos flourish and it has never been seen in open country. It flies powerfully and high; rests often on bamboo-leaves by paths in the early morning, sitting with its wings closed over the back on the top of a leaf; and is then sluggish because probably somewhat numbed from the cold of the night. Larvæ have been obtained close to the sea on the hills as well as further inland and

above the Ghats. The foodplant of the larva is bamboo. The first were on a large-leaved species called *Ochlandra taiboti*, Brandis; but, afterwards, many were obtained also on *Bambusa arundinacæ*, the common large species in Southern India. Swinhoe gives the habitat as Sikkim, Assam, Bengal, Kanara, Ceylon, Andamans, Burma. He says further that :—'The types (females) are from Calcutta and Cherrapunji; Elwes records it from the Naga Hills, Sikkim at 5,000' and Tavoy; Watson from the Chin Hills and Tilián Yaw; Manders from the Shan States. The type of *percullata* is from Ceylon, of *scopulifera* from the Andamans; of *sikkima* from Sikkim.' (*Lepidoptera Indica*, p. 299—on Pl. 825 the butterflies are depicted in Figures 1 to 1d, the larva and pupa in 1e).

Sub-genus—*Caltores*, Swinh.

**224. Baoris (Caltores) kumara**, (M.).—Male. *Upperside* dark olive-brown. Forewing with six semihyaline-white spots in a continuous series, commencing with two (or three) subapical in the usual curve and mere dots, the three discal ones in interspaces 4, 3, 2 inwardly-oblique, the uppermost a mere dot, the lowest about 1 mm. square, the outer edge generally sloping outwards; and a small, blurred dot or spot, sometimes absent at the middle of vein 1, just touching it above. A powdering of yellow hair-scales on costa above vein 12 and covering the whole cell; some longish, decumbent, ochreous hairs below the cell from base of interspace 1 and out in the upper half of it as far as end of cell; a dense covering of similar hairs in the space between inner margin and vein 1 to well beyond the middle of margin and a fringe of short hairs along the inner margin. Hindwing immaculate; a covering of decumbent, dark-brown, long hairs in upper part of cell and out to outer margin with lighter-brown, ochreous-tinged hairs on the rest of wing, those along vein 1a very dense. *Underside* somewhat paler, ochreous-tinted. Forewing with the area from base including the cell, down to inner margin and out to the outer margin at tornus and inside a line joining tornus to the uppermost of the three discal spots in interspace 4 blackish with the spot on vein 1 distinct, very much larger than on upperside but blurred with, sometimes, a pale indication of another above it. Hindwing uniform, the base of interspace 1a pale.—Female. Like the male but paler, the hairs on the *uppersides* of wings more ochreous; often, on forewing, a subhyaline-white dot-spot just under the outer half of the lowest discal spot, in interspace 1 not quite touching vein 2. On the *underside* this little spot is quite large and blurred, diffused and the spot below it is generally very much larger and longly diffused-pale inwards; on the hindwing *underside* there is a white dot always towards the base of interspace 2, never, apparently, present in the male. *Cilia* above and below on both wings usually very pale-yellowish, sometimes yellower. Antennæ black, the end of shaft and base of club beneath yellowish; there are some yellow specks at joints beneath; the tip of the club is very dusky-velvety (instead of, as in most skippers, reddish). Palpi brown above (not visible), ochreous strongly mixed with brown hairs on sides and below; third joint brown. Head and thorax brown mixed with ochreous hairs, often with a bloom; beneath ochreous mixed with brown, the legs pinkish-brown ochreous. Abdomen brown above mixed with ochreous and with obscure darker-brown segmental bands; below ochreous. Expanse 45 mm. at the most.

This species was called *plebia* by Davidson, Bell and Aitken and, later, *philippina*, when it was discovered that the former species is at once distinguishable by the male having, on the underside of the forewing, a tuft of hairs on the inner margin lying against the wing-surface and directed upwards. Their *kumara* (*Journ., Bom. Nat. Hist. Soc.*, vol. xi, 1897, p. 58) now turns out to be *seriata*, M., the next species described below.

*Egg*.—Highly dome-shaped. Surface dull, smooth, without sculpture. Colour that of a pinkish, dead bone.



*Larva*.—The body is of the same *shape* exactly as that of *Baoris farri*; circular in transverse section, fining to the rather small neck and much more gradually to the very broadly-rounded (it is semi-circular) anal segment; this anal segment has the free margin thickened, the thickening about one-quarter the length of the radius of the semi-circle and the dorsum inside this thickened margin is slightly convex transversely, sloping from front to extremity, very slightly pitted and quite bare of hairs while the margin has a fringe of erect fine, short, white hairs all along it, these hairs being about as long as the width of the thickened margin but some a little longer than others—the hairs of the body elsewhere are far shorter than these; prolegs, claspers and true legs very short, the claspers and prolegs held well under the body and green like the flattened ventrum; *head* is a somewhat high semi-circle, the vertex very widely rounded and hardly bilobed, the face slightly convex with the dorsal line somewhat widely depressed to apex of clypeus; the surface of head is somewhat superficially cellular-rugose and covered with extremely short, light, fine, erect hairs none of which are even as long as half the breadth of true clypeus except round the mouth-opening at sides and underneath where they are comparatively a good deal longer; the colour of the head is soiled whitish, often flushed with a tinge of brown in very heavily-marked specimens, with a very broad, black band all round it including the eyes; from this encircling, black band a dorsal band starts on vertex and runs down to apex of clypeus, is continued thinly to apex of true clypeus and again down the middle of that to labrum; often the encircling band is very broad and the other black markings more pronounced—there is also, in all specimens, a thin black line outlining both the true and false clypeus—and, even, a black, short flush upwards from the middle of the sides of clypeus to the middle of each lobe-face; the true clypeus is triangular, the apex acute, a little less than half the height of head, white with the sides thinly black, the dorsal line more broadly black; the false clypeus similar, reaching 0.3 mm. further up, the sides very slightly convex outwards, outlined thinly black also; the labrum is a transversely-oblong piece of 0.5 mm. long (the true clypeus is 1.35 mm. long by 1.2 mm. broad) by 1.2 mm. broad, the hinder margin absolutely straight, the front margin quite as long and emarginate widely in a curve; the ligula is squarely kidney-shaped, white like the labrum, 0.5 mm. long by 0.7 mm. wide with a frontal rounded sinus about one-third the width (rather less) and 0.15 mm. deep leaving a broadly-rounded lobe on each side; there is a 0.55 mm. long hair at each anterior lateral corner and another on the front edge more inwards of the same length on labrum and, on the ligula, there is a row of six hairs on each side of the sinus to the lateral-anterior corner, all about equally spaced considering each six as one group, the outermost three about 0.5 mm. long, on the extreme edge, the two next inwards shorter, removed away from edge somewhat, the innermost shortest and removed from the dorsal line by a distance rather greater than its own length (which is about 0.2 mm.); antennal, basal joint colourless as also the third; mandibles strong, 1.2 mm. broad, oval in section, the biting-ends quite entire, highly shining, lightish yellow-brown with ends very dark; eyes arranged: 1, 2, 3, 4 in a slight curve, equal in size and equally spaced, rather less than an eye-diameter apart, 6 in a straight line with 3, 4 but nearly four eye-diameters from 4 with number 5 behind forming an equilateral triangle with 4 and 6. *Surface* of body dull, the segments quite plainly expressed, with 6 impressed lines parallel to hinder margin attaining, the 6th, to about the middle of each segment; covered with minute, erect, light hairs about 0.05 mm. in length and spaced about 0.1 mm. apart; also a 0.1 mm.-wide, circular, disc-like tubercle below and slightly behind each spiracle. *Spiracles* longly-oval, whitish, nearly four times as long as wide; those of segments 2, 12 much larger. *Colour*, greenish-white with a whiter, broad, subdorsal band occupying the space between the subdorsal (theoretical) and the dorsolateral lines of the body; the ventrum and prolegs greener. L: 40 mm.; B: 5 mm.; B of head 3.5 mm. by 4 mm. high.

*Pupa*.—This is also exactly the same *shape* as that of *Baoris farri*, that depicted in Figure 3a of Plate II; with the same sort of snout in front between the eyes, the same type of bent-down, spatulate cremaster with a rounded, semi-circular end, the radius of the semi-circle being about one-sixth as long as the width at front margin of segment 14, the dorsum right back into 13 even deeply hollowed out leaving on each side a margin about half as wide as the hollow, this channel or hollow long-oval in shape; ventrally, the cremaster

is flat as far forwards as the clasper-scars and on each side laterally there is a slight extensor-ridge; segment 13 is about a third of the length of 12 and the proportions of the segments are exactly the same as in the pupa of *B. farri*; the head has the snout about the length of head-vertex and segment 2 together; the clypeus and ligula as in that species also; the proboscis reaches to end of cremaster or at least to end of 13; the midlegs reach three-quarters the length of wings, the forelegs over a half the length of wings; the eyes have the crescent linear and slightly behind the middle of the eye. Surface as in *B. farri*, with a similar hair-covering and similar tiny shining circular disc below each spiracle. Spiracle of segment 2 also as there, and the other spiracles also as in that insect. Colour similar also. L: 30 mm.; B: 5 mm.

*Habits*.—The habits as to oviposition are those of *B. farri*; the caterpillar behaves in exactly the same way, making a cell at first at the tip of the leaf by joining the edges, coating the inside of it with silk; renews the cell as required by feeding and growth in stature. The pupal cell is also similarly made, quite open, and the pupa is fastened by the tail and a body-band. The larva excretes a white, cereous powder as in *B. farri* which is always found more or less plentifully on the pupa and in the cell. The tail is fixed to a short length of silk rope fastened down at both ends on the pad at right angles to the longitudinal axis of body. The larva is very sluggish at all times but wanders out at night to feed; it lies inside the cell during the day with the front segments contracted a good deal, the head flattened back with the mouth directed forwards. The growth is normal and the duration of the pupal stage also. There must be a slack time during the hot weather when the growth must be slower or there must be an interval tided over in some way when the bamboos lose their leaves. It is probably passed in the larval state as noted for *Tagiades liligiosa*. In the monsoon months caterpillars are quite plentiful in N. Kanara from sea-level up to the highest hills wherever there is forest and the rainfall is sufficient. The species is not found in the plains. The butterfly is a strong flier that has much the same habits as *B. farri* and is found in the same places in Kanara. Swinhoe gives the habitat as S. India and Ceylon and says the types came from Kanara in S. India; adding 'the type of *seriata*, a female, from Ceylon (it is undoubtedly a female of *kumara*); we have both sexes from Karwar and Kandy; it is very nearly allied to *philippina*, Herrich-Schäffer from the Philippines, but is a larger insect; we have both sexes from the Nilgiris; Evans records it from the Palni Hills and de Nicéville from Calcutta.' (*Lepidoptera Indica*, vol. x, p. 301; figures of the male 1, female 1a, underside 1b and larva and pupa 1c are contained on Plate 826). The foodplant of the larva is any species of Bamboo.

Since the days when this was written about *seriata* many specimens of it and *kumara* have been bred side by side in Karwar in N. Kanara and it is very evident that they are two quite different insects although, except for the colouring of the heads and a slight difference in its shape and size, the larvæ are exceedingly alike. As will be seen by what follows.

**225. Baoris (Caltoris) seriata (M.).**—Male. *Upperside*: olive-brown of a very dark shade when fresh, fading a bit with age with a very faint tinge of russet that is hardly remarkable except it is compared with a male of *B. kumara*. Both wings as in *kuamara* with the identical same spots both in size and shape, in number too as there may be a fourth speck in interspace

9; but, here, the spot in interspace 1 just above vein 1 may occasionally be completely absent and the one above it is *never* present even on the underside; the decumbent hairs and the fringe along inner margin also the same in forewing. *Underside* as in *kumara* but very distinctly russet or rusty especially on the hindwing; on the forewing the single spot in interspace 1 is always sagittately (like an arrow) emarginate and never as diffused as in that species; in the hindwing there may be a white dot in the middle of interspace 2 or not.—Female. *Upperside* as in *kumara* in every way but without the slight rusty tinge of upperside of male *seriata*; the spot in interspace 1 just above vein 1 often arrow-shaped, that is with the outer edge triangularly sharply excavated. *Underside*: forewing has the spot in interspace 1 very slightly only diffused, much better defined than in *kumara* female, sagittate, the spot above it under vein 2 always invariably present, short, linear, directed obliquely inwards from the outer-lower corner of the spot of interspace 2 to the outer, upper corner of the arrow-shaped spot. Hindwing similar to that of male, a white dot in interspace 2 and sometimes 3 as well. *Cilia* as in *kumara*, perhaps a little paler. Antennæ also as in *kumara* as are the palpi, head, thorax and abdomen, as well as legs; but the antennæ are ochreous below all along the shaft as well as at the base of the club with small black tips below at the joints, the ochreous colour too somewhat invades the sides, especially at the club, leaving only the very back black. Expanse up to 45 mm. or occasionally even more in the female.

*Egg*.—Exactly as for *Baoris kumara*; same size, same colour and everything.

*Larva*.—The body is cylindrical in shape, fining off a little to the head from the middle where it is fattest, more quickly in segments 5 to 2; fining off hardly at all backwards to hinder margin of segment 10, then slowly to anal segment which has the dorsal line somewhat sloped and is large, shaped like a semi-circle upon a shortly-oblong, transverse basal piece; the semi-circular part is the anal flap and it is transversely evenly convex, becoming flatter towards the extremity which is hardly at all thickened and applied to the resting surface, overreaching the claspers by half its length; segment 13 is short, transverse, about one-quarter the length of 12 or 14 which are co-equal and it is shortened laterally in the spiracular region so as to be there nearly non-existent; claspers and prolegs very short, fleshy, with circular feet—the larva generally lies with the ventrum pressed flatly against the surface so that the legs hardly show at all; head is in shape a slightly lengthened semi-circle, broadest at middle, somewhat narrowed above, the face somewhat convex, the dorsal line very narrowly, shallowly depressed as far as the apex of clypeus; the surface of head is rugose with little shallow cells all over superficially but distinctly, leaving a broad space along clypeus curving round to the eyes and extending a little up on each side of dorsal line quite smooth; the whole surface is shining and covered all over with a clothing of the minutest, light, erect hairs imaginable, a few about eyes and the one at the extremity of antenna much longer, the minutest about 0.05 mm. long the one at extremity of antenna 0.6 mm., others about eyes 0.25 mm.; the true clypeus triangular, reaching about half the height of head, equilateral with the apex acute, the whole the colour of head with a deep-brown dorsal line down middle and outlined similarly; the false clypeus a moderately broad strip outside with its sides somewhat convexly out-bowed, its apex acute reaching two-thirds height of face; labrum transverse, its apex acute reaching two-thirds height of face; labrum transverse, its hinder margin straight, anterior margin very strongly triangular-emarginate, its length 0.45 mm. and its width 1 mm. like the clypeus, the colour greenish; ligula rather squarish, convex, 0.45 mm. long by 0.6 mm. wide with the emargination 0.1 mm. deep and 0.25 mm. wide, rounded, the colour also greenish; antennal, basal joint greenish, the third orange, mandibles of the block type, chestnut or dark red-brown, darker at ends, the cutting edges quite entire; the eyes arranged 2, 3, 6 in a straight line, 4 one eye-diameter from number 3, number 6 three eye-diameters from 4 with number 5 behind and about two diameters or more equally from 4 and 6, numbers 1, 2 joined (the line joining their middles) would meet the line 3, 4, 6 in an angle of 120°, number 2 being an eye-diameter from 3 and slightly behind line 3, 4, 6, number 1 rather less than an eye-diameter above 2; the colour of the head is white with a slight yellow tinge, ligula and labrum and clypeus as well as dorsal depressed line somewhat greenish, with a broad, blackish band completely surrounding the whole from and including the eye-curve to vertex and over it but not encroaching upon the face, the true clypeus outlined narrowly



blackish with a dorsal line the whole length of this clypeus; the orange of third joint of antennæ slightly invades the bases of gulae. *Surface* of larva is dull, each segment with the usual six depressed, thin, transverse lines or folds taking up half the length from hinder margin forwards; the whole with some extremely minute, erect hairs, those round the free margin of the anal flap much stronger, longer, reaching 0.3 mm. long, quite a conspicuous fringe. *Spiracles* small, oval, flush, opaque white, those of 2 and 12 much larger. *Colour* greenish-white, segments 2 to 4 greener, whitest in a broad, subdorsal band, yellowish about segment-margins when constricted; true legs, prolegs, ventrum green, the last greenest; the body is flanged slightly along the dorso-ventral margin and there are patches of a cereous excreted powder under it on the common margins of segments 10 and 11 and segments 11 and 12 before pupation; the dorsal line between the whiter, broad, subdorsal bands pulsates slightly. The head is about the same diameter as segment 4. L: 40 mm.; B: 5 mm. at middle; diameter of head: 3 mm. or even 4 mm.

*Pupa*.—This is naked and green in colour like all those of the *Notocrypta-Baoris-Parnara* group; it is of exactly the same *shape* as those: circular in transverse section, thickest at middle, fining to shoulders very little and equally little to segment 11; the diameter is about the same at eyes as at shoulders and before eyes suddenly narrows into the conical base of a long, cylindroconical frontal process or snout that is porrect between the eyes, quite cylindrical in its distal third, more or less conical in the middle and quite conical at base; this snout is as long nearly as the thorax and very slightly bent down, the tip bluntly rounded; segment 12 is short and about half 11; segment 13 is about equal to 12 or, perhaps, rather shorter; 14 is a longly semielliptical piece, the edges raised dorsally leaving the space between depressed like a spout, the whole as long as 12+13, the extremity rounded and it is quite thin: segment 2 is about equal to 12 and has both margins straight, the dorsal line inclined forwards at about 40° to the longitudinal axis, merging gradually behind into the surface of the thorax which has its dorsal line in about the same plane that is continued back as far as segment 6, the highest point of pupa; the hinder margin of thorax is a semi-circular curve meeting the wings in an angle of about 50°. *Surface* quite smooth and even without constrictions except the very slight ones at the mobile segment-margins of 8/9, 9/10 and 10/11; under a strong lens it is covered with minute, short, erect, light hairs all over but nowhere at all densely; the proboscis is continued free beyond wings to the end of the cremaster. *Spiracles* are oval, flush, not small, more opaque-white than the pupa; those of segment 2 are slits with a slightly-raised, opaque-white, semioval surface of the same diameter as the length of slit on the front surface of thorax. *Colour* glaucous, translucent grass-green all over, a little more opaque on wings and segments 1 to 3; with a subdorsal, broad, whitish line. The cremaster is slightly down-bent, the suspensory hooklets are very small, bunched at its very end ventrally. L: 30 mm. nearly including the head-point or snout which itself is about 3 mm.; the cremaster is also 3 mm. long; B: 5 mm. at middle.

*Habits*.—The egg is, as a rule, laid at the tip of the upperside of a leaf. The young larva eats the shell and turns over a bit of the edge onto the top to make the cell. Later on it joins the edges of a leaf together making a conical cell which it lines with silk. It is a close fit. The larva goes out to feed and renews the cell as necessary as it gets bigger. It pupates on the underside of a leaf fastening a few silks from edge to edge that, contracting, make a 'spout' in which it lies with its back towards the earth; fastening itself in by a body-band and a tail-pad, this tail-fastening consisting of a strong, short, transverse band attached to the pad, the hooklets of the cremaster being attached to its middle.

In *Lepidoptera Indica*, page 301. Colonel Swinhoe quotes the following remarks from 'Davidson, Bell and Aitken,' which as they were actually written originally by the present writer in 1897, are known to apply to this insect (*seriata*) and not to *kumara*, may be here repeated:—'*Baoris seriata* is a very common insect at all times

and places in the N. Kanara District of the Bombay Presidency. It basks like the last (*Baoris farri*), but always on leaves; and is fond of flowers in the early morning; it is easily captured when basking as it returns to the same leaf, repeatedly, after being disturbed; it has a very rapid flight. We have bred many specimens at all seasons. It is not nearly so common close to the sea in Karwar as it is further inland in the big jungles. Colonel Swinhoe says 'The types are from Kanara, S. India; the type of *seriata*, a female from Ceylon (it is undoubtedly a female of *kumara*). . . .' is quoted already under *Baoris kumara*. Mr. Ormiston has published figures of the genitalia of both *seriata* and *kumara* in the *Report of the Proceedings of the Third Entomological Meeting* held at Pusa in February 1919, Plate 172, Figures 41 to 44 (*kumara*) and 45 to 48 (*seriata*) which show very considerable differences between the dorsal and ventral aspects of the tegumen in the two species in Ceylon. They correspond exactly with those of the two species in Kanara.

The head of *seriata* larva is 4 mm. broad by exactly the same in height if the prominence of the mandibles is taken in the height, if they are left out the height is only 3.6 mm. The true clypeus is 1.3 mm. in height by 1.1 mm. in breadth; the false clypeus reaches further up the face than the true one by 0.3 mm. and the greatest width of its somewhat outwardly-convex sides is 0.2 mm.; the labrum is perfectly straight along the hinder margin, the width measuring 1.1 mm., the lateral length 0.4 mm.; anterior margin of labrum widely curved-emarginate, its length in the dorsal line 0.25 mm. and its width exactly equal to the hinder margin; the length of the hair in the anterior, lateral corner of labrum is 0.475 mm. The great majority of the little hairs on the head are 0.05 mm. long but the longest about mouth-opening is 0.6 mm. and the one at the end of the third antennal joint is longest of all: 0.65 mm.; the third joint of antenna is 0.3 mm. long, rusty in colour with a 0.75 mm. long, double-jointed appendage beside the long hair on its apex. The eyes of the head are each 0.125 mm. in diameter and prominent; the topmost eye 0.01 mm. from the second which is an equal distance from the third; the fourth is 0.15 mm. from the third, the sixth or lowest is 0.4 mm. from the fourth; the fifth is 0.4 mm. from both fourth and sixth. If all this is compared with similar measurements given for *kumara* it will be seen that there is very little to be got out of them to indicate that they are different species. Here in *seriata* the head is a bit shorter, not so high but broader. Which is not very much to go on. Absolutely the only difference between the two larvæ is that the head of that of *kumara* is very much more heavily marked with black than that of the other.

**226. *Baoris (Caltoris) conjuncta* (Herrick-Schæffer).**—Male. *Upperside* 'dark olive-brown. Forewing with nine semidiaphanous, yellowish-white spots: two in the cell towards its end, one above the other, well-separated, touching the margins of cell; three small subapical spots of equal size in an outwardly-oblique, well-curved line; the others in an inwardly-oblique, discal series, one in each interspace, the spot near the base of the first median interspace being largest, its lower end produced outwards; the spot above it about half its size and with its outer-lower end also somewhat produced: the uppermost,

small spot about the size of the subapical ones; a spot at the middle of vein 1. Hindwing with two or three small, discal spots and a white spot near the upper end of the cell. *Cilia* of forewing cinereous, of hindwing whitish with cinereous base. *Underside* paler. Forewing with the spots as on the upperside. Hindwing with a small, white spot near the upper end of cell and a discal series of small, white spots. Antennæ black, the tip of the club pale-red, the shaft and club on underside whitish, the shaft spotted with black; palpi, head and body concolorous with the wings; palpi beneath whitish, legs tinged with dull red.—Female like the male, the spots on the forewing usually larger and, consequently, closer together; the largest spot of the discal series usually much larger. Expanse 40 mm. to 47 mm. (Swinhoe, *Lepidoptera Indica*, vol. x, pp. 309-310).

In a fairly large series bred in N. Kanara District of the Bombay Presidency the males on the *upperside* forewing have the costa above vein 12 sprinkled with thin, ochreous-yellow scales, the lower half of the cell nearly out to the spot in it and below the cell in interspace 1 as far as base of vein 2 set with decumbent, yellow hairs which also occupy the inner margin upwards to vein 1; and there is a slight fringe of brown hair along the inner margin; also, occasionally, there is a tiny extra dot above the three subapical ones as well as a tiny dot underneath the largest discal spot in interspace 1. Hindwing with the upper half of cell and outwards above vein 6 set with purplish-tinged, decumbent hairs; underneath cell and including the lower half of it from base to very nearly the outer margin of wing the surface is set with ochreous, decumbent hairs very densely at base and all along vein 1a; the discal dot-spots are in interspaces 2, 3 and 4; the spot in the cell is rarely visible. *Underside* forewing with the spots all as on upperside with that in interspace 1 always somewhat blurred along the outer border and, nearly always, with the little spot above it even when it is not present on the upperside. Hindwing with white dot-spots in interspaces 2, 3, 4, 5 and 6, that in 5 always tiny and sometimes wanting. The undersides of the female hindwing is often shot with a distinct purplish-blue sheen or tint.

*Egg*.—Is of the ordinary type of the genus: dome-shaped; the surface finely frosted-looking, smooth, slightly shining; colour whitish. It is broadest at the surface of attachment. B: 1.5 mm.; H: 1 mm.

*Larva*.—Is, in *shape*, exactly the same as those of the genus: head large compared to segment 2; body about the same breadth from segment 4 to segment 12, the dorsal line between these points nearly straight, the ventral surface flattened; the head generally, when the larva is at rest, held with the mouth well forward, the top pressed back against segment 2, the front segments drawn together considerably and, therefore, the dorsal portion of segments 3-5 somewhat prominent; the anal end always flat on the resting surface, the legs and prolegs short; segment 13 considerably less than half segment 12 in length; segment 14 less than segments 12 and 13 together, semielliptical in shape, broadly rounded at extremity, sloping with segment 13 at an angle of less than 30° to the longitudinal axis. *Head* curvilinearly equilateral-triangular with the apex rather narrowly rounded and with a small, triangular sinus in the dorsal line which is afterwards depressed slightly as far as the apex of the clypeus; the face somewhat convex; the true clypeus longly triangular, about half the height of face; the false clypeus an even strip outside it, nearly two-thirds the height of face, likewise triangular and rather difficult to trace whereas the true clypeus is indicated by a fine, somewhat dark line, the surface is finely cellular-rugose and covered with minute, erect, fine, whitish hairs all over, the main dorsal, dorsolateral and lateral hairs somewhat longer, also erect, light and fine and some longer hairs about the borders of mouth and base of gulæ; the labrum small, arc-shaped, whitish-translucent; the



ligula moderately large, glassy-white, semi-circular with a shallow, rounded sinus and the lobes bordered with hairs in front; the antennal, basal joint whitish, the second rusty-red; the mandibles blackish with their bases rusty; the eyes four in a curve, the three uppermost rather closer together, the sixth much further down, the fifth forming an equilateral triangle with 4 and 5, behind them; colour whitish with a large, black, circular spot on each lobe towards the upper face and another, similar lower down in front of the eyes, and a larger, quadrate spot about half way up at hinder margin on each lobe (which may be absent) and a black triangular mark on vertex of head in dorsal line. *Surface* of body dull, covered with minute, light, fine, erect hairs in the same manner as the face or head; 6 or 7 fine, depressed, transverse lines parallel to and in front of the hinder margin of each segment, the spiracular region somewhat corrugated, the margin (free) of anal flap slightly tumid; this free margin of anal flap set with a rather dense fringe of hairs of co-equal length, much longer than the hairs on the surface of body generally. *Colour* light sap-green suffused whitish, the ground-colour showing through in very numerous, roundish dots or spots which each bear one of the minute hairs; a longitudinal, broad, dorsal band of opaque white from segment 2 to anal end with, sometimes, a slightly darker, much narrower, central band; and a thin, white, spiracular line; ventrum light green. L: 40 mm. when stretched; B: 5 mm.

*Pupa*.—The *shape* is the same as that of the genus: *head* with prominent eyes, square in front, parallel-sided, with a long snout pointing straight out in front; this snout cylindrical in its distal two-thirds and its base filling up the frons between the eyes, truncated at tip and finely rugose transversely, as long as the head and 2 together; segment 2 is a short, transverse piece 1.5 mm. long, the thorax 5.5 mm. long both ascending at an angle of 20° or so to the longitudinal axis of the body; the thorax is only very slightly humped-convex longitudinally running smoothly into the dorsal line of abdomen, its front margin straight, the shoulders evenly-rounded and in no way prominent, its hinder margin a short parabolic curve meeting the wings in a broadly-rounded, deep angle of 90°; segment 4=5=half 6=1 mm.; segment 7=2 mm.; segment 8=2.5 mm.=9=10=11 with segment 12 again just 2 mm.; segment 13 very short, hardly a fourth of 12; the cremaster about 3 mm., spatulate, bent down considerably in a curve, the end somewhat narrowly rounded, bearing the bunch of very short, hooked shafts at its very extremity, its dorsum largely hollowed out in the form of a wide, deep channel leaving narrow lateral borders decreasing in width backwards with the proximal half of sides also slightly hollowed out, the distal half ventrally quite flat; transverse section of body from shoulders to 12 is circular; *head* with a rather large, hexagonal clypeus quite ventral at base of snout, followed by a diamond-shaped ligula as long as clypeus and twice as long as broad; the proboscis free beyond wings to end of cremaster and, sometimes, even further; the midlegs reaching three-quarters of the wing-length, the forelegs half the wing-length, the antennæ between the two; the eyes are not prominent and have the crescent linear and just behind the middle. *Surface* shining and covered with 0.05 mm.-long, erect, white hairs that are not visible to the naked eye; segments distinct; abdomen and thorax transversely minutely, superficially wrinkled, segment 2 more confusedly, the snout more coarsely. *Spiracles* of segment 2 are somewhat convex, oval spaces as long as the adjacent antenna is broad, making a small lobe to front margin of thorax; the rest are oval, rather pointed at both ends, yellow like the lobe of spiracle of 2, more than twice as long as broad, about six spiracle-lengths to a segment length. *Colour* is a darkish sap-green with a subdorsal, broad, white longitudinal line the whole length of the body; laterally a bit whitish. L: 40 mm. over all; B: 7 mm.; snout 4 mm. long.

The same little round disc-tubercles noticed in larva and pupa of *Baoris kumara*, etc., are also present here in larva and pupa.

*Habits*.—The egg, always laid single, is invariably deposited on the underside of the blade of coarse grass or bamboo. The little larva makes a cell at the tip of the blade by drawing the edges together: a cylindrical cell and eats along the edges further up. When full-grown this cell is very laxly made and, of course, takes most of the blade of grass except when the grass happens to be

of a very large species—these are mostly chosen in preference to small-bladed species. When about to pupate, the larva gets onto the underside of a blade, lies fully stretched and draws the edges slightly together by spinning a few silks across at the ends and in the middle so as to make a half-tube, spins a pad of silk at one end on the midrib to which it attaches its anal end and fixes itself further by a fairly tight body string or band over segment 4 or 5; there is always a little white, cereous powder round the tail-pad. The pupa lies thus quite exposed from below. The growth of the larva is fairly rapid; the duration of the pupal stage is normal. The imago is a very strong, rapid flier, fond of sitting low down on leaves or even on the ground; likes shady places although it is found practically everywhere in Burma and Central and South India, in jungles, hills and plains, in regions of heavy rainfall as well as fairly light rain from sea-level up to two or three thousand feet. The flight is often quite straight, sometimes in jerks and curves and insects are fond of returning to the same resting-place; they fly chiefly about 11 o'clock in the day and visit flowers quite freely. The distribution is given as Kangra, Burma, Central and South India. Butterflies are very plentiful after the monsoon months in Kanara (Bombay) District along the borders of roads, paths and open spaces. A common foodplant is *Saccharum*.

**227. Baoris (Caltoris) colaca** (M.).—Male. *Upperside* dark olive-brown. 'Forewing somewhat more produced than is usual in the genus with ochreous-white spots, all more or less small: three subapical, in an outwardly-oblique curve; a discal, nearly straight, inwardly-oblique series of four spots, the first and uppermost immediately below the lowest subapical and of about the same size as it, the next a little larger in interspace 3, the third the largest of all in interspace 2, its lower-outer edge produced, that edge somewhat curved with the fourth against the middle of vein 1, touching it above, about the size of the second (in interspace 3); in the type specimen there appear to be no spots within the cell, but in most examples there is a minute dot at the upper end and, in others, there are two well-separated ones, one above the other. Hindwing without marking. *Cilia* cinereous, brownish at base. *Underside* paler and duller in colour. Forewing with the basal half of its middle blackish, spots as above. Hindwing somewhat produced at the anal angle, a discal series of minute, white dots, varying in number in different examples. Antennæ black, the shaft dotted with white on the underside; the basal half of the club white beneath with extreme tip tinged red; palpi with black and white hairs above, pure-white beneath with a few black hairs; head and body above concolorous with wings; beneath, pectus and thorax whitish; abdomen beneath white with grey bands.' (*Lepidoptera Indica*, vol. x, pp. 316, 317).

In a long series of this species bred at different times in N. Kanara District of the Bombay Presidency where the rainfall is very heavy, there are the following differences:—*Upperside*. Forewing may have the spots in the cell or they may be completely absent or one of them may be wanting; the discal spot in interspace 4 is nearly always slightly larger than the lowest of the subapical dots and is generally the same size as the one in interspace 3 but is quadrate while the latter is produced at the lower end outwards like the largest below it; the spot in interspace 1 is sometimes as large as the one of interspace 3, sometimes smaller, or may even be completely absent. Hindwing has generally a tiny dot in interspaces 2 as well as 3. *Underside* always, except in very rubbed specimens caught outside, bright greenish-ochreous,

The central area of forewing from inner margin upwards and inwards to base blackish as in Swinhoe's description with the spot in interspace 1 somewhat blurred on outer edge where it is deeply excavated making the whole like an arrow-head and it is much yellower than the rest, also there is a whitish diffused shade above it between it and the spot in interspace 2 which shade may sometimes be a mere dot; and there may even be a tiny extra subapical dot in interspace 9. Hindwing has the discal series of white dots, one in each interspace 2, 3, 5 and 6 nearly always present and, sometimes, even one in the cell. Besides, on the forewing upper-side, the base of the wing out to half the cell and much further out along the inner margin below vein 1 is covered with ochreous scales (below costa) and decumbent, long, ochreous hairs and there is only a slight fringe of hair to inner margin. Hindwing the surface above the cell and over vein 6 is covered with some blackish, decumbent hairs; the rest of the surface with longish, ochreous ones thickest, as usual, all along vein 1a. Antennæ ochreous beneath; palpi below with an ochreous tint; abdomen below with no vestige of segmental bands; the legs ochreous.

Swinhoe has another species which he calls *Caltores bevani* (M.), immediately following this in his book and he quotes Aitken and Davidson for the larva and pupa. De Nicéville says 'Recorded in the first Kanara paper, p. 370, n. 79 but omitted by Mr. Bell from the second paper. It is doubtless a wrong identification, the specimens referred to being *B. guttatus*, Bremer and Grey, n. 216 ante, though it may occur in Kanara, as Messrs. Elwes and Edwards record it from Bombay (l. c., p. 283). I have no specimens of *B. bevani* from any part of S. India. In Bombay Mr. Aitken says he has bred it on grass. It is doubtful if he knew the species when he wrote.' He did not, for the writer of these papers now knows he did not. De Nicéville's extract is taken from a paper on the foodplants of the butterflies of the Kanara District published by him in the *Journal of the Asiatic Society of Bengal*, vol. lxxix, part ii, No. 2, 1900, pp. 187-278.

*Larva*.—The shape of the body is the same as that of most of the genus: circular in transverse section, thickest about the middle, fining down very little thence until about segment 3 forwards where segment 2 is much smaller, about the same breadth as the head, segment 3 is somewhat broader, segment 4 again broader, segment 5 about equal to the breadth at middle of body whence it decreases very gradually indeed backwards to cremastral or anal segment which is about as broad at its base as half the breadth at middle of body, is a parabolic curve in shape, somewhat longer than broad at base, convex transversely, sloping slightly dorsally, the end overreaching the claspers by about half the length of the segment; the prolegs and true legs all short, green; the head large compared to the neck but otherwise small for a skipper, the second segment without any raised or coloured collar; the head very little higher than it is broad across the base, triangular in shape, the face convex, the surface coarsely reticulate-rugose, somewhat shining; the true clypeus very long and narrow, nearly twice as long as broad at base, parallel-sided until near its apex, then acute-triangular, the whole half the length of face; the false clypeus a rather broad strip outside it, not as broad as half the breadth of true clypeus, forming an arch over the apex of this latter; the labrum rather shortly transverse, as long as one-third the height of true clypeus in length, colourless; the ligula narrower than labrum, nearly as long as broad, curved on the lateral edges, the front rather shallowly triangularly emarginate and set with bristles, colourless or slightly soiled round the edges; antennal basal joint colour-



less, the second joint soiled at tip; the mandibles large, their cutting edges entire, light-yellow in colour with the ends broadly black along the cutting edges; the eyes black, numbers 1-4 and 6 in a slight curve, 6 twice as far from 4 as 4 is from 3, the others equi-spaced, number 5 behind and nearest to 6 forming a triangle with 4 and 6; colour of head whitish with the whole of the cheeks from vertex to base at eyes black or the lower portion sometimes only suffused blackish leaving the middles of lower cheeks immaculate, a black line dorsally down middle of face from hinder margin over vertex to apex of clypeus, then down the false clypeus on each side of the true one, sometimes less, sometimes more far down, sometimes a suffusion of black in the middle of face outside these central dorsal markings and, in certain larvæ, again, the black may be replaced by brown-orange and, in some cases, black-orange may be the predominant colour; or the markings may be nearly obsolete. *Surface* of body is covered rather densely by a clothing of short, fine, erect, white, 0.05 mm.-long hairs, a fringe of these hairs 4x as long round the margin of the anal segment; the head also provided with these short hairs, becoming longer about mouth-opening; the segments well marked with the usual 6 or 7 parallel, transverse folds from hinder margin of each forwards. *Spiracles* small flush, oval, 0.15 mm. by 0.1 mm.; those of segments 2 and 12 at least three times as large; all whitish or light yellowish in colour. *Colour* light glaucous-green with a subdorsal, lateral and faint, spiracular, white line the whole length of body. L: 25 mm.; B: 4 mm. in the middle.

*Pupa*.—The pupa is like that of any other *Parnara* in *shape*; the body is circular in transverse section; the head-piece is absolutely parallel-sided with the front broad and produced out into a long snout which is in a line with the longitudinal axis of the body and broadly conical at the base, nearly cylindrical at the end, the outer half about as long as the dorsal visible portion of the vertex of head, this snout being a production of the lower vertex, the frons being beneath it and ventral; segment 2 is a narrow, parallel-sided, transverse band, its dorsal line in the same plane, at about 30° or less to the longitudinal axis of the pupa, as the head-vertex and the front slope of the thorax: it is about as long as the head-vertex without the snout; the thorax is feebly convex, hardly humped, its highest point or apex being just before its hinder margin which is a semicircular curve (perhaps nearer a short parabola) meeting the wings in a very widely open, largely rounded angle of about 60°; segment 4 is, in its dorsal line, equal to 5 in length, both being only half segment 6; segment 6 to segment 12 are coequal or very nearly so, in length; segment 13 is very short, only about one-quarter 12 and quite parallel-sided (i.e., the front margin parallel to hinder margin); segment 14 is half as long again as 12 and is longly triangular with the extremity broadly rounded (about half as broad as the segment at base), the margins thickened into ridges leaving the central dorsum hollow longitudinally, the whole segment very flattened and thin, the massed cremastral hooklets occupying a line at extremity ventrally across; the proboscis is extended free beyond the wings to segment 12 and even further, the antenna reach half way, the midlegs three-quarters, the palpi are larger and there is nothing between the margins of legs and proboscis. *Surface* not shining, smooth, the segments well-marked, no clothing of any sort. *Spiracles* of segment 2 indicated by an opaque, oval, more or less subcutaneous, greenish body; the rest very small, oval, flush, whitish or greenish, difficult to see. *Colour* bright grass-green with distinct, white, longitudinal, subdorsal, fine and lateral, slightly broader lines the whole length of the body; there is also an indistinct, spiracular thread; the cremastral segment translucent-white. L: 20 mm. over all; 18 mm. without snout or cremaster; B: 4 mm.

*Habits*.—The eggs are laid single towards the tip of a blade of grass; the young larva emerging, makes a cell by drawing together the edges from the tip backwards with cross-silks; it eats the edges outside and clothes the inside with silk. As it grows larger it makes a more and more slovenly cell until, eventually, when full grown, it lives practically open on the undersides of leaves. It pupates on the underside of a blade of grass spinning two cross-threads to draw the edges loosely together and is attached by the tail and a body-band; the larva emits a cereous excretion from the

sides of the abdomen on segments 11, 12 and the pupa is sometimes lightly covered with this. The butterfly frequents grasslands, rice-fields, jungles in all sorts of country and flies low down amongst the herbage; it flies well and strongly, feeds greedily at low flowers and basks on the uppersides of leaves or on the ground with its wings half opened, the lower often depressed below the plane of the upper. It rests with the wings tightly closed over the back on the ground very often, on twigs, leaves, etc. Swinhoe gives the habitat as 'Sikkim, Assam, S. India, Burma, Ceylon, Andamans, China, Malay Peninsula and Archipelago.' It is common in Kanara, Belgaum, Poona and frequents the plains as well as the hills, the rainfall seeming immaterial. The larva feeds upon soft grass of all sorts and rice but never on bamboo.

#### Sub-genus—*Chapra*

*Imago*.—As in the sub-genus *Baoris* or *Caltois* in colour, markings and general facies; but are insects that fly close to the ground and live amongst the herbage; rest on the ground generally with the wings closed over the back, fly only for short intervals but quickly, powerfully and are more or less fond of sunlight and open places.

*Antennae*.—With the club short and stout, the terminal crook short, as long as, or slightly longer than the width of the club.

*Palpi*.—As for genus.

*Forewing*.—With a linear, discal stigma in the male from the basal third of vein 2 to a little beyond the middle of vein 1 in a straight line, inwardly oblique. Venation exactly as in genus.

*Hindwing*.—As for genus.

*Egg*.—As for genus.

*Larva*.—As for genus, but with the head more triangular in shape and with, generally, a stripe of red, brown or black separating the face from cheeks.

*Pupa*.—Exactly as for the genus.

*Habits*.—As for genus except that the larvæ all feed upon grass instead of, sometimes, bamboo. Further see under '*imago*' above.

**228. *Chapra mathias* (F.).**—Male. *Upperside*: dark olive-brown, somewhat glossy. 'Forewing with eight semidiaphanous, whitish spots; two small ones at the end of cell one above the other and well-separated from each other; three subapical minute dots of equal size in an outwardly-oblique curve; and three discal spots in a continuous series with the subapical more or less, the uppermost discal spot minute like the subapical ones, the next somewhat large, the third largest of all in interspace 2, their outer sides somewhat produced; all these spots vary much in size in different examples, sometimes all are minute and indistinct; the sex-streak is whitish. Hindwing usually without markings but there are, rather rarely, two indistinct, pale, discal spots. *Underside* paler. Forewing blackish on the basal half between the veins 1 and 2; the spots as on the upperside. Hindwing with a white dot in the cell near its upper end and a discal series of four white dots, one in each of the interspaces 2, 3, 4, 5. Antennæ black with white dots on the underside of the shaft, the club white beneath; palpi with grey and white hairs above, white beneath; head and body concolorous with the wings; beneath the pectus and abdomen are white and there are some hairs on the thorax; legs pale brownish-ochreous.—Female. Like the male, the spots all larger and an extra spot on vein 1 in continuation of the discal series. Expanse 35 mm. to 40 mm.' (Swinhoe in *Lepidoptera Indica*, vol. x, pp. 321, 322).

The *upperside* forewing in the male has ochreous scales above vein 12 on the costa and upper half of cell; ochreous hairs at base of interspace 1 as far out as the discal stigma and similar decumbent, longish, ochreous hairs between vein 1 and inner margin nearly out to outer margin with a slight fringe only along the inner margin. Hindwing has the whole wing including cell and the part

below it covered by longish, decumbent, ochreous hairs from base to three-quarters way out to outer margin, specially dense in interspace 1a; the portion above below costa down to top of cell and vein 6 with shorter, decumbent, brown hairs more sparsely. *Underside* hindwing may have a dot in interspaces 1b, 2 to 7, one in each as well as in cell, those in 1b, 5 smallest as a rule and the first to be absent, those in 2, 4 largest as a rule.—Female invariably lighter in colour and with, on the forewing, not only a spot more than the male on the upper edge of vein 1 but also, very frequently a dot-spot just under the largest discal one in the top of interspace 1 but also a further dot-spot in interspace 5, the furthest out of any. Antennæ with the underside of club only whitish on the basal half, the tip of it red-brown.

Swinhoe quotes Forsayeth for the larva and pupa as under:—

*Larva*.—Found on long, coarse, green meadow grass; head triangular, on a neck; a brown line on margin of head. Body grass-green with light-yellow bars across back; a whitish line along either side above origin of legs.

*Pupa*.—September 3rd: Two larvæ have become pupæ; they lie alongside a blade of grass attached by a band across thorax, and also at tail; head generally points upwards; body of a translucent-green colour, quite naked and unenclosed in any covering of any description. September 13th: both pupæ have become imagoes to-day; they are a species of *Hesperiidae* very common about here, flying briskly by day and settling on leaves of trees at dusk. October 9th: another imago to-day, same history as above.

Swinhoe further gives the distribution as India, Ceylon, Burma, China, Japan, Malay Peninsula and Archipelago; adding that it is 'A very common species with a very wide range; our figures of the larva and pupa are from W. Elliot's original drawings, bred in Madras.' These figures are depicted upon plate 831 in *Lepidoptera Indica*, 3 the male, 3a the female, 3b the underside and 3c the larva and pupa.

**229. Baoris (Chapra) subochracea, (M.).**—'*Upperside* brown tinted with ochreous. Forewing with eight semidiaphanous spots disposed as in *C. mathias*, but all larger, the two cell spots placed obliquely, the lower one shifted a little inwards whereas in *mathias* they are erectly placed one above the other; in *mathias* they are always small, in this species they are much larger, prominent and distinct. Hindwing: with three small, discal spots, the upper one the largest. *Cilia* ochreous-brown on the upper half of forewing becoming white hindwards; on the hindwing with an ochreous-brown base. *Underside* paler and more strongly tinted with ochreous. Forewing with the middle space from the base outwards to one-third before outer margin blackish; spots as on upperside with a somewhat diffused, additional, white spot attached to the upper end of the spot in interspace 1. Hindwing with a prominent, round, white spot in the cell near its end; the discal series prominent, the upper spot large and round. Antennæ black, spotted with white below, the club on the underside white; palpi above with grey and white hairs, greyish below; head and body concolorous with wings; on the underside the pectus and abdomen are greyish-white, the thorax with grey hairs; legs ochreous-brown.—Female like the male; but, on the upperside of the forewing, there is an additional spot in the discal series on vein 1 and two additional dots, one immediately below the outer side of the spot in interspace 2, the other below the subapical dots but a little outside of them; on the underside the two lowest spots are pure white; the spots on the hindwing are larger and there is sometimes an extra dot on the underside; but one or more of them are absent in some examples. Expanse 37 mm. to 42 mm.' (Swinhoe in *Lepidoptera Indica*, vol. x, p. 322. There are figures also of the butterfly and larva and pupa on plate 832, figure 2 male, 2a female, 2b underside, 2c larva and pupa).



De Nicéville, over twenty years ago, published an article in the *Journal, Asiatic Society of Bengal*, vol. lxi, Part II, 1900, pp. 187-278 which he called 'The Foodplants of the Butterflies of the Kanara District of the Bombay Presidency with a Revision of the species of Butterflies there occurring, in which he states under No. 241 *Baoris (Chapra) subochracea*, Moore, on p. 276 that 'Mr. Bell thinks that this species and the following' (which is 242 *Baoris (Chapra) mathias*) 'are one and the same, in which I am inclined to follow him as I have never been able to separate them satisfactorily. The form with the underside grey, typical of *subochracea*, is never found in Kanara in the rains and is probably a dry-season form of *B. mathias*. Messrs. Elwes and Edwards (l.c., p. 275) keep them distinct. They say that the form of the male genitalia is different in the two species.' The genitalia pictured are certainly very different.

*Egg*.—In *shape* it is a dome. *Surface* shining and, under a powerful lens, obscurely, minutely, hexagonally reticulate and, at the extreme base, there are distinct indications of the beginnings of very faint, meridional ridges, many of them; the micropyle on the apex is extremely small and hardly perceptible. *Colour* when fresh is very light-green, soon changing to dull bone-colour. B: 0.75 mm.; H: 0.5 mm.

*Larva*.—The body is of the *shape* characteristic of the genus *Parnara*: circular in transverse section, thickest about segment 5 and somewhat backwards, thinning rather suddenly in 4, 3, 2 to head and much more gradually backwards to anal segment, the ventrum somewhat flattened, especially when the larva is sitting with the front segments somewhat contracted, the head laid back on segment 2, in which position the legs and prolegs are hardly visible; segments 2 and 13 are, as usual, very short; the anal segment is rather long, flattened, overhanging the anal claspers by a good deal, broadly rounded at end where it is fringed with comparatively long, porrect, fine, white hairs; the *head* is triangular in shape, a good deal longer than it is broad across the base where the mouth-opening is, the vertex narrowly indented in dorsal line with a small, triangular emargination; colour lightish-green, the false clypeus as well as true clypeus both outlined thinly brown very often, a nearly 1 mm.-broad brownish-red band from eyes, just including front eyes, between face and cheeks to vertex of each lobe, sometimes thinly joined across vertex well in front of hinder margin, this band flanked thinly by white in front and more obscurely behind; the surface coarsely reticulate-rugose and set with minute, semi-decumbent, fine, white 0.05 mm.-long hairs, these hairs longer about mouth-opening, the surface slightly shining; the true clypeus nearly half the length of face, acutely triangular, twice as high as it is broad at base, the sides very slightly waved or bent inwards about middle; the false clypeus less than half its width, a broad outwardly-convex band on each side, arching over apex and with its own apex also acute; the labrum transverse, rusty-suffused, under one-third the true clypeus in length, hinder margin straight, front margin slightly curved; the ligula rather shorter than labrum, kidney-shaped, the sinus very shallow, rounded, the outer rather acute and fringed with hair, colourless-shining; the antennal, basal joint green, the second rusty; the mandibles large, the cutting edges entire, their colour yellowish with the ends broadly red-brown; the eyes black, arranged in a curve as regards the top four which are equally spaced, an eye-diameter apart, the 6th in a line with 3 and 4, three times as far from 4 as 4 is from 3, the 5th behind forming an equilateral triangle with 4 and 6. *Surface* dull, covered with minute, white, fine, erect hairs all over of 0.05 mm. in length, those on the free margin of anal segment 4x as long and each segment folded transversely from hinder margin forwards in 6 or 7 parallel, superficial folds. *Spiracles* small, oval, flush, very light yellow in colour, those of segments 12 and 2 larger. *Colour* is yellow, segment 2 pure green; all but segment 2 covered densely with dark-green, rounded dots arranged more or less in transverse rows; the folded parts of anterior segments especially

yellow-looking; a dark-green, dorsal line, a lateral, thin and a spiracular, broad, white line or band; ventrum watery blue-green. L: 30 mm.; B: 4 mm.

*Pupa*.—This pupa is identical with that of *Baoris colaca* in shape with the proboscis similarly produced free to segment 12 beyond the wings, the antennæ reaching half-way towards ends of wings the midlegs three-quarters the way; the head-piece exactly similar, the snout bearing the same proportion to head-vertex as in that species, the segment 2 the same; the thorax and planes of dorsal lines of the three segments similar, segment 13 very short, the cremaster long, similarly shaped, down-curved; segments 4, 5 in dorsal line coequal, segments 6 and following segments  $2\times$  their length; the hinder margin of thorax, however, meets the wings in an angle of  $45^\circ$ , this angle similarly widely rounded. *Surface* similar. *Spiracles* also similar. *Colour* lighter green with the same subdorsal and lateral, white, longitudinal lines, here, however, reaching no further forwards than the hinder margin of thorax. L: 25 mm. over all; over 21 mm. without cremaster or snout; B: 4.5 mm. The thorax is, perhaps, slightly stouter than in the pupa of *Parnara colaca*.

*Habits*.—Similar to those of *Baoris colaca* but the larva starts in a cell made of the point of the leaf turned right over and back onto the upper surface of blade, the two edges on each side being joined together—the blade is transversely folded back that is instead of longitudinally manufactured into a small tube. Later on the larva lives on the undersides of the blades, often without any cell; it pupates on the underside free, the edges of the blade loosely drawn together with a cross-thread fore and aft, the bottom of this open cell covered with a cereous excretion, the pupa fixed by the tail and a body-band. The insect is a strong, fast flier, frequenting grass-lands and jungles all over India; does not fly high; often lights on the ground and basks there and on leaves with its wings half open, the hindwing depressed below the upper; at rest it sits with them joined over the back in some sheltered position. Swinhoe gives the habitat as India. He also figures the butterflies, larva and pupa on Plate 832 of *Lepidoptera Indica*, figures 2 male, 2a female, 2b undersides, 2c the larva and pupa—none of them good representations of nature.

Sub-genus—*Parnara*.

*Imago*.—These are marked in nearly exactly the same manner above and below except that the actual colour of the undersides is here nearly always bright-ochreous compared to most other species of the genus *Baoris*. They all sit for preference on the ground, bare or otherwise and rarely on leaves; they frequent all sorts of country; they are rapid fliers.

*Antennæ*.—Very short, less than half the costa of forewing, even shorter than it is in *Chapra* and with the club very stout and the apiculus or crook very small, never as long as the width of the club.

*Palpi, hind tibiæ*.—As for the genus.

*Forewing, hindwing*.—As for the genus.

*Egg*.—Also as for the genus.

*Larva*.—See below under *Parnara bada*. It has a round head recalling those of the genus *Telictota*.

*Pupa*.—See below also. It is not anything like the other members of the genus *Baoris*.

*Habits*.—Here again the habits of the larva in making the cell as well as the fact of the pupa being tightly enclosed instead of more or less naked and open is quite different from others of the genus *Baoris*.

**230. *Baoris (Parnara) bada* (M.).**—Male. *Upperside* dark-brown with 'an ochreous tint. Forewing with the basal half of the interspaces with dull ochreous, hair-like setæ; with eight semidiaphanous, ochreous-white spots of

moderate size, two in the cell, well within its end, well-separated, one above the other; the others in a continuous series, commencing with three subapical spots in interspaces 6, 7, 8 in a straight line, the uppermost one often absent; a small similar-sized discal spot immediately below them in interspace 4; a larger discal spot in interspace 3 with a much larger and somewhat quadrate spot in interspace 2; all three of these discal spots in an inwardly-oblique line. Hindwing with all but the outer portion of the wing covered with dull-ochreous hairs with four spots in a very oblique line on the disc, one in each interspaces 4 and 5 (vein 5 is wanting) and 2, 3 (sometimes also in 6). *Cilia* of both wings rather bright ochreous-white with a brown base. *Underside* paler with an ochreous-pinkish tint, all the veins of both wings, all but the inner portion of the forewing and the entire surface of the hindwing covered with dull ochreous scales; the spots as on the upperside, the spots on the hindwing somewhat larger than they are on the upperside (with an extra white spot at extreme-lower end of cell and sometimes one in the very middle of interspace 7 as well); the spots on the hindwing somewhat larger than they are on the upperside, somewhat quadrate in shape and edged with blackish (more brownish and not always the case). Antennæ black, minutely dotted with white on the underside, the club smeared with white on the underside and dull-red at the tip; palpi, head and body concolorous with wings; on the underside the palpi and pectus with ochreous-white hairs and some similar but duller-coloured hairs on the thorax and abdomen.—Female paler than the male, on the underside usually very much paler; markings similar, all the spots much larger (not really very much), somewhat suffused; a small additional spot against vein 1 of the forewing; the discal spots on the hindwing larger, somewhat elongate and very prominent; on the underside there is a small spot in the cell near its end.'

The above is Swinhoe's description of *Parnara guttata* (Bremer and Grey); with the exception that what is added in brackets is taken from a series of bred specimens of *Baoris (Parnara) bada*, (M.), all from the N. Kanara District. He then next describes this latter species by comparison with *guttata* (*Lepidoptera Indica*, vol. x, p. 329), differentiating it by saying it is smaller, its upperside being dark-brown without the ochreous tint while all the Kanara specimens have got it when not absolutely new (they are, of course, much darker when freshly bred as are all other butterflies); he says that the hairs covering the hindwing are as in *guttata* but grey in colour and not dull-ochreous as in that species while in the Kanara butterflies they are ochreous, at any rate in the rains. He further says that, in the forewing upperside there are only two subapical spots 'the uppermost being absent, the two subapical quite minute, being mere dots; the other three discal spots increasing in size hindwards, all three quite small and there are no cell-spots'. Now, in Kanara—and there was never any question as to the species existing there being typical *bada*—there are very often three subapical spots and not absolutely minute either, the discal spots are of quite a respectable size and not at all 'quite small'. He goes on to say that, in the hindwing, *bada* has three dots on the disc in an outward curve in interspaces 2, 3 and 4 while the Kanara series often show them in 2, 3, 4, 5 and even an indication in 6 on the upperside—on the underside there is one in 7 as well occasionally and nearly always one in the end of the cell. The only real difference that there is appears to be in the female and it consists in the absence totally of the spot 'against the submedial vein in continuation of the discal series so prominent in *guttata*' although, as he says, it is sometimes 'only very slightly indicated' by an obscure paleness. In *bada* in N. Kanara there is always a green glint, somewhat metallic, on the thorax and top of the head.



It will be noticed that in the description of *bada* (though not actually in words, yet in comparison with *guttata*) Swinhoe leads to the conclusion that there is no cell-spot on the underside of the hind-wing in the male. In Kanara specimens there is often such a cell-spot, in fact generally, in both sexes, practically always in the female. He says that *guttata* on the underside has an 'ochreous pinkish tint'. The Kanara *bada* never has a pinkish tint but is always a bright greenish-ochreous, the green very slight indeed. Most of the specimens were bred in the rains and are a good deal brighter underneath than insects caught in the cold weather and dry season which are duller and lighter—as is the case with practically all butterflies.

Elwes and Edwards in 'A Revision of the Oriental Hesperiidæ' in the *Transactions of the Zoological Society*, 1897, vol. xiv, Part IV, pp. 101-324, consider that *Baoris guttata* and *bada* are one insect. Swinhoe considers they are two species, saying 'de Nicéville says that, in his opinion (*Journ. As. Soc., Bengal*, 1895, p. 550), it is quite distinct from *guttata* and we have come to the same conclusion'; meaning by 'it' the form or species *bada* now under consideration. He, therefore, as in duty bound, confines *guttata* to N. W. Himalayas, Sikkim, Assam, China, Japan and Korea saying that it does not appear to occur anywhere in Southern India or Ceylon.

*Egg*.—This is higher than half the breadth, the *shape* of a dome based on a very narrow, 0.02 mm.-wide, transparent, shelving, ring or band for pedastal or foundation. *Surface* shining, quite smooth except for some minute pits that are very superficial and irregularly disposed over the surface, never more than 0.5 mm. apart from each other and there are very obscure indications of meridional ribs 0.05 mm. a part all along the foundation-band but nowhere else; the micropyle is a small pit at apex. *Colour* pearly-white when extruded but becoming duller whitish afterwards. B: from 0.9 mm. to 1 mm.; B: 0.5 mm. to 0.6 mm.

*Larva*.—The *shape* of the body is subcylindrical, the ventrum flattened, somewhat swollen-looking about the spiracles of segment 12, making that segment appear a slight bit broader than 11; segments 13, 14 becoming suddenly narrower than 12 at the front margin of 13, with 13 itself extremely short, 14 rounded semicircularly behind with a dorsal slope of about 30° in which 13 participates; the body is thickest about segment 8, being highest there; there is a distinct neck; the *head* rounded or long-semicircular in shape with parallel sides and broadly-rounded vertex, very slightly bilobed, the dorsal line depressed slightly as far as apex of clypeus; the surface of the head cellular-rugose, shining somewhat, haired minutely under the lens and it is a greenish yellow-brown in colour with a black-brown stripe separating the cheek from the face of variable width and a dorsal band of the same colour from vertex down to the apex of the clypeus splitting down each side of it and also with another line of the same colour on each lobe parallel to the dorsal line, starting from the middle of each side of true clypeus to run up to somewhere about the level of the false clypeus (middle of face); there is a thinnish, black collar reaching from spiracles to spiracle just behind the middle of segment 2 and the segment is more or less chitinated dorsally; the hinder margin of the head itself is always dark blackish-brown. *Surface* of the body covered with minute tubercles, each bearing an equally minute, erect hair longest round the anal margin and also longer along the dorsoventral line of body although there not as long as on segment 14 margin; all segments well expressed. *Spiracles* slightly-raised and somewhat conspicuous, oval and light-brown in colour, those of segments 2, 12 larger than the rest. *Colour* of body greyish-green slightly yellowish on the segment-margins. L: 33 mm.; B: 5 to 6 mm.

*Pupa*.—This is of the *shape* of the pupæ of *Telicota* and quite unlike the other *Baoris* species; the *head* is square in front, the eyes not prominent; segment 2 is short, it and head being parallel-sided, slightly transversely convex, sloping slightly up to thorax; the thorax is stout, very little humped, very little wider than segment 2; there is very little dorsal constriction at 5; shoulders evenly rounded; the body is circular in transverse section from shoulders to segment 11, decreasing very little in width; after 11 it narrows rapidly to end, cone-wise, the cremaster pointed-triangular, forming the apex or end; the proboscis outreaches the ends of wings but is only produced free as far as the middle of segment 10. *Surface* of body is covered all over with a white, cereous, excreted powder and therefore is difficult to see but is no doubt covered with short, erect hairs. *Spiracles* of segment 2\* \*\*; the rest oval, brown, inconspicuous. *Colour* of pupa a watery, very light yellowish-green for head, thorax and wings; a dirty whitish-yellow for abdomen. L: 20 mm.; B: 4.75 mm.; H: 4.75 mm.

*Habits*.—The egg is laid on the underside of leaves or blades of rice or grasses. The larva makes a cell out of blades of grass joined together with silks, making a firm, tight house from which it comes forth to feed. When about to pupate it makes this house very strong and lines the whole of the inside plentifully with silken carpet, excreting also much white powder. Both the ends are closed so that no moisture can get in. The caterpillars are generally to be found in numbers in the monsoon months in the rice-fields where the imago is also always plentiful. This butterfly rests much on the surface of the ground and frequents paths, roadsides and open spaces everywhere in the jungle and right out in the plains, in hilly country whether dry or subject to the heaviest rainfall. It inhabits, according to Col. Swinhoe, India, Ceylon, Burma, Formosa, Malay Peninsula and Archipelago and Hongkong. He says 'The types are from Ceylon, it is a common species, recorded from many parts of Southern India, Ceylon and Burma; it does not appear to occur anywhere very far north; we have it from Belgaum in S. India, we took it at Bombay and have it from Rangoon and many other localities; Watson records it from the Chin Hills; Davidson, Bell and Aitken from Karwar where they bred it; Elwes from Perak, Java, Borneo; Butler from Formosa; J. J. Walker from Hongkong; de Nicéville from Calcutta, Cachar and Sumatra; de Nicéville says that, in his opinion, it is quite distinct from *P. guttata* and we have come to the same conclusion; all Plötz's types came from Java.'

The conclusion that is to be drawn from all the above is that there is but one somewhat variable species of this *Baoris*. Swinhoe apparently considers there are four: *guttata*, *bada*, *vaika* and *flexilis*. *B. vaika* is a synonym of de Nicéville's *philotas* which is nearly certain to be an underbred *bada*. *Flexilis* (Swinh.), is surely not a tenable species.

The next species *Baoris* (*Caltores*) *canaraica* (M.), put under the sub-genus *Parnara* (Swinhoe treats these sub-genera as full families) by Swinhoe, is, by antennæ and habits, actually a *Caltores* as characterized by himself. He probably had specimens without antennæ and made the mistake that way. From specimens both bred and captured in Kanara the insect is certainly a *Caltores*.

231. *Baoris* (*Caltores*) *canaraica* (M.).—Male. *Upperside* 'dark olive-brown. Forewing with ochreous-grey setae on the basal half of the costal space and

some ochreous-grey hairs at the base of the wing below the cell; eight moderate-sized, semidiaphanous spots: two in the cell towards the end, well-separated, placed obliquely one above the other; the others in a continuous series, three uppermost subapical in an outwardly-oblique curve, three discal in an inwardly-oblique line, increasing in size hindwards, in interspaces 4, 3, 2, the last somewhat outwardly produced. Hindwing without markings, all but the outer margin covered with ochreous-grey hairs. *Cilia* brown, the tips becoming whitish towards the hinder margin of forewing and throughout the hindwing. *Underside* slightly paler than the upperside. Forewing with the hinder-marginal space before vein 2 paler caused by minute, greyish-white scales; the spots as above with an additional, indistinct, whitish spot on vein 1 in continuation of the discal series. Hindwing with the costa narrowly, the abdominal fold and a broad discal band of minute, whitish scales. Antennæ black with white spots on the underside of the shaft, the club smeared with white, the tip tinted with red; palpi, head and body concolorous with the wings, with ochreous-grey hairs; on the underside the palpi, pectus and abdomen with ochreous-white and blackish hairs and some similar hairs on thorax; legs brown above, ochreous-grey beneath.—Female like the male but on the upperside there is an additional white spot to the discal series of the forewing, situated on vein 1 about the size of the spot in interspace 3; and on the underside of the hindwing there are three minute, white, discal dots in interspaces 2, 3, 6. Expanse 35 mm. to 42 mm.'

The above is written by Swinhoe in *Lepidoptera Indica*, vol. x, pp. 326, 327. Since it was published, the butterfly has been reared and quite a respectable series has been got together in its habitat given as 'Kanara, South India' by Swinhoe. It apparently has never been obtained anywhere else.

*Larva*.—This is of exactly the same type and *shape* as that of *Baoris kumara* or any of the others, the anal segment broadly rounded, overreaching the short anal claspers; the prolegs and true legs also short, especially the former and green of a light colour like the ventrum; the head semielliptical in shape with the vertex somewhat narrowly rounded compared to the other *Caloris* species (*Kumara seriata*), the surface moderately shining and rather roughly cellular-rugose, covered with tiny, erect hairs with the main hairs about double the length, some about the mouth-opening at most four times the length of the shortest which would be about one-quarter the basal width of the clypeus, the antennal hair rather longer still; the colour very pale-yellow with a dark-brown band containing the uppermost four eyes and a brownish smudge in the middle of the clypeus, against its base and running up half way followed by a dorsal line to its apex that is still more obscure; this true clypeus long-triangular in shape, the apex acute, the colour of the head, reaching about half the length of head (the head is about 3.5 mm. broad by the same in height), that is to say 1.4 mm. long by 1 mm. wide (in the estimated height of the head the prominent mandibles are included and they add some 0.4 mm.); the false clypeus is a narrow strip outside the true one of slightly over 0.1 mm. in breadth arching somewhat widely over the apex of the true clypeus and reaching rather more than 0.2 mm. further up, this apex acute; the labrum is a transverse piece as broad as the clypeus (1 mm.) and about 0.2 mm. long; the ligula a circular, quite transparent piece about as long as twice the length of labrum by slightly more than that in breadth with a small sinus; antennal basal joint the same colour as the ventrum more or less with the second joint light-rusty; mandibles large, 0.6 mm. wide, light-rusty with broadly dark rusty-brown, regular ends, the cutting-edges quite entire; the eyes 0.1 mm. in diameter, numbers 1, 2 hardly half an eye-diameter apart, 2 just over 0.15 mm. from 3 which is also the distance between 3 and 4, number 6=0.35 mm. from 4, and 5 behind 4, 6 removed from number 6 a distance of 0.2 mm. and about the same from 4, all arranged with 1 to 4 in a slight curve, number 6 in a straight line with 3, 4 with 5 making the apex of a triangle behind 4, 6. *Surface* of body dull, smooth to the eye but covered with minute, erect, light hairs 0.05 mm. long and with somewhat thickened tips, those round the free margin of segment 14 are 0.15 mm. long; the segments are all distinct and have the usual impressed six lines parallel to the hinder margin, the last somewhere near the middle of



the segment. *Spiracles* oval, flush, yellowish, those of 12 and 2 larger. *Colour* bluish-white like that of *Baoris kumara* or *farri*. L: 44 mm.; B: about 6 mm.

*Pupa*.—Exactly the same *shape* as that of *Baoris kumara*, with the identical same cremaster and snout to the head but shorter than in that species; the relative lengths of the segments are the same too and 13 is about one-third of 12, segment 14 (cremaster) being somewhat longer than 12 with the same dorsally hollowed-out cremaster; the *head* has the clypeus similarly triangular or hexagonal, the ligula similarly diamond-shaped but rather large; the forelegs reach about half the length of wings, the midlegs three-quarters, the antennæ ending between the two, the proboscis, however, is not so long as in *kumara* and ends at the hinder margin of segment 10. *Surface* of body with the same minute 0.05 mm. long, erect hairs; the abdominal surface being slightly transverse-wrinkled also, the segments quite distinctly marked. *Spiracles* of segment 2 similar pale-yellowish ovals about as long as the adjacent antenna, is broad, flat; the rest are about one-eighth of a segment-length long by rather less than half that broad and are flush, rather pointed-oval, light yellowish-white in colour. *Colour* as in *kumara*. L: 30 mm.; B: 5 mm.

*Habits*.—More or less the same as for the others, *farri*, *kumara* and *seriata* as to oviposition, places chosen for such and habits of making the larval cell. Imagines were obtained in the N. Kanara District of the Bombay Presidency in the year 1895 some forty miles inland from the coast in the heavy jungles of the Western Ghats by the writer and the larva was discovered shortly afterwards in the same locality. The species was first captured in the same District by a Revenue Officer of the name of Ward who lived there sometime in the middle of last century and had not been heard of again afterwards until 1895. It is not really a very rare insect, having been seen fairly frequently in places frequented by *kumara* and *seriata*. Quite recently specimens have been bred at Karwar itself on the actual coast from larvæ obtained only a few miles inland; but the localities they came from are very wet in the monsoon. The larva feeds on Bamboos generally, of any species. No specimens of this species have ever been obtained anywhere but in Kanara.

(To be continued.)